2: Underhill E-5 (1931-1935)1939 NU28 Papago NU28

This is an example of the economy of abundance. The land was all subject to drought and the fields were tiny but there was enough for every one, either at the wash in question or at another. The peaceable acceptance of this fact is in sharp contrast to the attitude of the neighboring Mohave in the Colorado bottom. There the land was rich but it was limited and boundary disputes were so frequent that a special form of fight was developed to settle them.[1]

With the fields marked out, each family had the duty of clearing the land and perhaps digging a ditch which would bring the water to a point where it would flood the area. This meant labor and when such labor ceased, the governor might allow another family to use the land, but they must relinquish the right, if any of the original family even the most distant relatives, came back and asked for it.

There were certain duties which the family owed to the village, as a form of tax. It must join with the others in digging a reservoir to catch rain water for drinking purposes since the water of the wash was too muddy and intermittent. Also, if the plain was such that the flood water was not distributed well, it might be necessary to build a short main ditch. Both ditch and reservoir must be cleaned every year and sometimes there were subsidiary ditches though never a real irrigating system. The decision as to cleaning was taken up in council and every man was bound to help.

During the father's lifetime his sons worked the land under his direction and after his death they might continue to do so for a while. (I, 1, A, B, C, D, E; I, 6, A, B, C, D; I, 5, A, B, C). Ultimately, as their families grew, they divided the land between them but with very little formality. Sometimes two sons kept their land together (I, 5, A, C) sometimes one was a hunter and got the family meat while his brothers did the farming (I, 8, E). If more land was needed, one of the sons asked permission of the council and broke land at a distance, his brothers helping him in the work (I, 8, B).

Daughters were expected to marry into another village and share their husbands' land. Until they did so, their living was provided in the family group and they were sheltered in the house of any brother who had room. If they returned after divorce or widowhood, they were treated in the same way. There is one instance of an unmarried woman being given land by her brothers but in that case, she was apparently about to marry and the land was given to her husband as a member of the group. (I, 3, C, 2). In another case, a widow with a grown son had land which we may consider as given to the son on the same system (I, 1, A, 3). A woman, in fact, was

[1] Kroeber, 1925, p. 744.

3: Underhill E-5 (1931-1935) 1936
NU28 Papago NU28

dark but there are white lines in the east. Those are the white hairs of Elder Brother who made us. He put them there so we can know when day is coming and we can go out to look for food.

We crawled out the little door. I remember that door so well. I always crawled out of doors till long after I was a married woman and we stopped being afraid of enemies. Then we made houses with white men's doors. But this one was little and when we came out we could see the houses of my relatives nearby among the cactus, and the girls coming out of them, too, to get water.

Those girls had nothing on above the waist. We did not wear clothes then. They had strips of hand woven cloth in front and behind, tied around their waists with a string, for we did not know how to sew them together. Only deerskins the men knew how to sew, but our people had traded this cloth from Mexico and we thought we were very fine. And with good red paint above the waist, it *was* fine. And warm too. But the girls did not put on their paint in the early cold morning. Then they had to work.

There was no water at Mesquite Root; no water at all except what fell from the clouds, and I am telling about the month of Pleasant Cold when the rains were long over. Then our pond had dried up. If we wanted to stay in our houses, the girls had to run for water far, far up the hills and across the flat land to a place called Where the Water Whirls Around. That was a low flat place, a good place for corn, and the water ran down to it from all the hills. A big water hole was there full of red mud. Oh yes, our water was always red. It made the corn gruel red. I liked that earth taste in my food. Yes, I liked it.

The girls used to crawl laughing out of the houses, with their long black hair hanging to their waists, and they would pick up their carrying nets. Fine nets we used to have in those days, all dyed with red and blue. Shaped like a cone they were, with tall red sticks to keep them in shape. When the net was on a girl's back those red sticks would stand up on either side of her face. We used to think a pretty young girl looked best that way. That was how the men liked to see her.

I was too little to have a net than, or even clothes. But I used to help my cousins put the jars in their nets and to put little sticks between them so they would not break. The boys would stand laughing around and if there was one who was not a relative the girls would joke with him. They would throw gravel at him and run away, and once a girl said to one of my cousins: "Give me that male thing you have and I will put it between my water jars instead of a stick." So we called that man Between-the-Jars. Yes, that is how we joked in the old days.

4: Joseph et al D, E-5 (1942-1943) 1949
NU28 Papago NU28

Chapter III

MAKING A LIVING IN THE DESERT

241 IT IS obvious to the casual visitor that, even today, making a living in Papaguería demands continuous hard work and careful use of every available resource. Up to the eighteenth century the Papago were semisedentary farmers, who supplemented agriculture with hunting and the gathering of wild plants. Their way of life depended upon making the best use of rainfall and run-off, for the few year-round sources of water were in the mountains. Corn, beans, and squash were planted in small fields in the valleys where the washes fanned out, and, when the July rains came, the flash-flood waters spread over the ground. In many places flood waters were led from the wash to the fields by short ditches, but year-round irrigation was not possible because the washes ran only after a heavy rain. As noted in chapter ii, there is some evidence of an effort to canalize water from the mountains to the fields.

312 221 The people could remain in the valleys as long as there was water in the *charcos*—which were the only source of water except the flood waters of the washes. When the *charcos* dried up, the villagers moved back to the permanent springs or shallow wells in the mountains. In September and October the Papago harvested their crops, dried what was not immediately used, and stored it in baskets which could be transported easily.

222 Wild plants were an important supplement to field crops, and from April through September much time was spent in gathering them. In the spring the cholla cactus buds were dried and stored, to be boiled and eaten later. In April a kind of wild greens matured. In May and early June came the important saguaro harvest, when families camped in the foothills and picked the juicy fruit from the tops of the tall cacti. Some they ate fresh, and some was dried whole to be used later as candy, though the greater part was boiled down into jam or syrup, and stored in jars to be used as sweetening or to be fermented into wine during the rain ceremony (see chap. vi). In July and August some of the people crossed the Baboquivari Mountains to the high grassland and

4: Joseph et al D, E-5 (1942-1943) 1949
NU28 Papago NU28

231 422 Thus the concept of individual ownership began to infiltrate established concepts of use-ownership by the group.

231 177 Horses also made possible further contacts with white ways. When crops failed in Papaguería, the Papago of the southern villages often rode down into Mexico to work for ranchers. There they learned something of white methods of livestock care but, more important, were introduced to the idea of working for pay. Payment was always in kind—seed, knives, or other necessities—but the situation was quite different from co-operative labor for group subsistence. People in the northern villages who worked for the Pima Indians, whose irrigated fields produced plentiful harvests, were paid in grain.

177 Thus, well into the twentieth century, Papago ways of making a living remained fundamentally unchanged. The Desert People became familiar with the white man's use of domesticated animals, his grains, and his traditions of individual ownership and paid labor; but these things did not violently disturb their way of life. Papago life went on, little changed from its course during the last three hundred years.

THE RESERVATION ECONOMY

177 With the establishment of the Reservation in 1917, and particularly with the change in Indian Service policy in 1933, the shape of things began to change in Papaguería. In the shift from an economy of only semisedentary farming with a few half-wild cattle to one of agriculture, livestock, and wage labor, the government has played a leading role.

The improvements necessary for this shift have been made or supervised by the Indian Resources Branch of the Agency staff, consisting of the Soil and Moisture Control, Forestry and Grazing, and Extension departments, and by the Engineering Branch, including Roads, Irrigation, and Construction and Maintenance departments. Their job is to show the Papago how to utilize his own limited resources most efficiently and to assist him in developing new ones.

177 491 The building and improvement of roads and trails have been important contributions to Reservation economy. From 1933 until 1943, seventy miles of primary road and forty miles of secondary road have been constructed by the Roads Division. The CCC constructed nearly two hundred miles of truck trails. But, according to Agency estimates, less than half of the needed roads have been built, and thirteen of the thirty-six villages of more than fifty inhabitants have no roads.

177 312 To improve the water resources of the Reservation, the government drilled deep wells at many villages, thus assuring a year-round water supply and

4: Joseph et al D,E-5 (1942-1943) 1949
NU28 Papago NU28

making unnecessary migrations between valley and mountains. *Charcos* were built or improved, small dams erected in water courses, and other improvements made in water conservation, under the supervision of both the Engineering and the Resources branches.

In this arid country without year-round streams, large-scale irrigation must come from deep wells; this is possible in only very limited areas on the San Xavier Reservation and at Chuichu at the northern tip of the main Reservation. There is some use of *"bolsas,"* diked fields to which water is brought from washes or arroyos by ditch and allowed to stand and seep into the soil, thus insuring moisture for a crop, but most Papago families have flash-flood farms much like those in use for centuries, watered naturally by the spreading floods. To others water is conducted through ditches;[2] at Menager's Dam in the southwestern corner of the main Reservation sixty acres are now under ditch irrigation.

Perhaps the most important departure from old ways of making a living came through efforts of the government to make livestock the basis of the Reservation economy. The improvement of the water supply was intended to be the first step in this direction. Papago methods of handling (including those learned from early government officials) had greatly depleted a range that was originally poor. Up to about 1930 range use was irregular, and cattle moved from water hole to water hole, overgrazing the surrounding areas.[3] This overgrazing caused the disappearance of perennial grasses and their replacement by growths that offer poorer forage and do not hold the soil, thus starting serious erosion.

The Resources Branch has set up experimental farms and nurseries to determine the usefulness of various grasses and plants for this area. By such experiments it is hoped to develop plants that will hold the soil and provide good forage.

The effects of spotty range use were aggravated by the fact that the Papago ran far too many livestock. Even as late as 1943, with the more general use of the range resulting from a better water supply and despite a considerable reduction in stock, the number of animals being run on the Papago range was about twice its carrying capacity as estimated in 1939. Many of these animals were horses of negligible value.

The Tribal Council, which has seen the necessity for better and fewer

2. In line with Carter's terminology, the former method is "arroyo flood farming." The use of ditches is "arroyo flood irrigation" (see George F. Carter, *Plant Geography and Culture History in the American Southwest*, p. 114).

3. Data in this section are largely from United States Bureau of Indian Affairs, *Program, Papago Reservations, Arizona*, referred to subsequently by title only.

[text continues on p. 33-Amlyst]

4: Joseph et al D, E-5 (1942-1943) 1949
NU28 Papago NU28

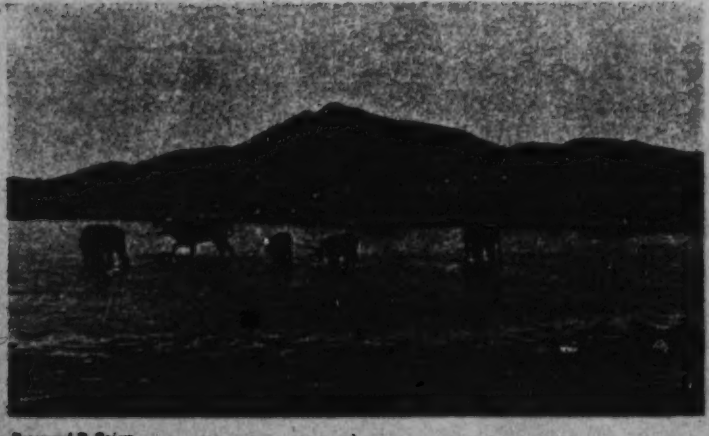
PLATE III

137

Raymond B. Spicer

a) End of a drought

312



Raymond B. Spicer

b) Cattle drinking in a shower

WATER MEANS LIFE

[p. 32]

4: Joseph et al D, E-5 (1942-1943) 1949
NU28 Papago NU28

Chapter IV

THE PAPAGO FAMILY

342
352 HOME to a Papago is a small cluster of low, earth-colored buildings in a clearing encircled by creosote or mesquite bushes and cacti. The house is commonly a one-room structure, but there may be several rooms or, if the family is large, even several small houses. Near by is a ramada, roofed with dry grass and protected on two or three sides by a paling of saguaro ribs or ocotillo branches, which, if watered, may take root in summer and form a wall with green leaves and brilliant red flowers. Here, in good weather, cooking and other household chores are done. Suspended from crotches or pegs in the ceiling beams are bridles and other horse gear, the family washtub, and various domestic paraphernalia. A forked post holds a large olla pottery jar of water from which everyone drinks. (Water is treasured, for it must be hauled by wagon from a well which may be several miles away.) One or more tiny huts serve as storerooms for tools and grain, and space is often set aside for a chicken yard and a corral. In the yard the dogs lie sleeping in the shade of the family wagon.

● [312]

361
512 The Desert People spend most of the year out of doors. Their personal belongings are kept indoors, and in winter they sleep inside, but at least half the year they cook, eat, work, sleep, and visit in the yard or under the ramada. Nevertheless, there is a high degree of privacy, for the brush and the distance between houses or house clusters allows each family to live unmindful of the neighbors.

312 The old Papago house, a round structure thatched with grass, has not been used in most parts of the Reservation for fifty years. Modern houses are of the Mexican type: wattle-and-daub, adobe, or stone construction. The wattle house, which is built of saguaro ribs or ocotillo branches plastered with mud, can be cheaply and quickly put up by almost anyone. The adobe brick house is more difficult to construct, and usually helpers must be hired, hence the poorer families cannot afford this type of housing. Stone houses, built near accessible rock outcrops, also require considerable labor and skill and are rather rare.

[Text continues on p. 42-Analyst]

4: Joseph et al D, E-5 (1942-1943) 1949
NU28 Papago NU28

621 watered by a wash are responsible for keeping it cleared; each must see to that
476 portion which runs through his field.
241 Keeping fences in repair is also often a co-operative job. When a single fence divides the fields of two men, they share the work and expense of keeping it up; however, a fence or part of one which runs along only one man's property is his responsibility.

PLATE VIII

[312]

United States Indian Service

WORKING TOGETHER

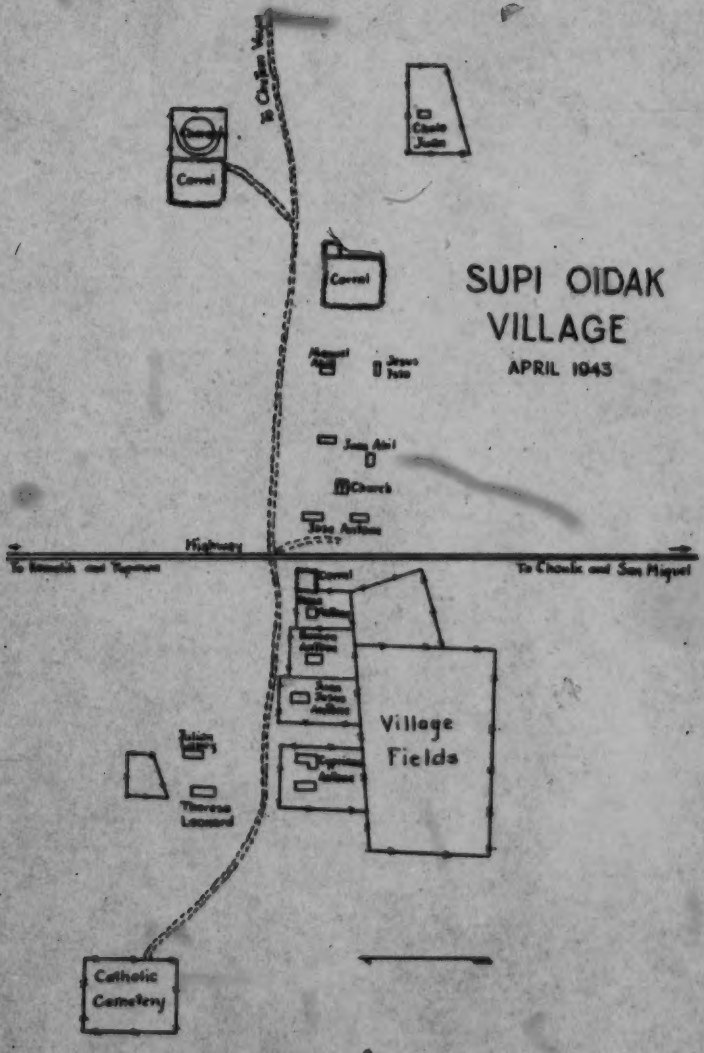
The white man's way: paid labor. Pouring concrete for a community stock tank, a CCC project

621 In Topawa there are two other community enterprises: the blacksmith
476 shop and the village well. The shop, a corrugated metal building situated in the
312 center of the village and well stocked with tools, was built with government
326 funds at the request of the village, but it is the people's responsibility. Two men keep the keys, and any villager who wishes to use the shop is free to do so. The well, at which all the stock are watered when the *charco* goes dry, was also built by the government and is operated by the village. One man is responsible for running the motor and keeping up the supply of water, but each household contributes money to buy gasoline.

4: Joseph et al D, E-5 (1942-1943) 1949
NU28 Papago NU28

361
491
312
764

MAP IV



SUPI OIDAK VILLAGE, APRIL, 1943

[p.64]

4: Joseph et al D, E-5 (1942-1943) 1949
NU28 Papago NU28

312

PLATE XX

DUSK OVER PAPAGUERÍA

United States Indian Service

[p. 203]

5: Castetter & Bell N-5 (1938-1940) 1942
NU28 Papago NU28

times in the arroyos to live on the bean of the mesquite, and again in the plains, seeking the pitaya, the tuna, the sahuaro and other wild fruits. Sometimes they go to the Colorado River to obtain food amongst the Yumas through their skill in their disorderly dances, and at other times down to the missions of Pimería where, by the same means and by their tenuous labor, they obtain a little grain, and a few pieces of Sayal to cover the most immodest parts of their bodies." A similar uncomplimentary characterization of the region from Caborca to the mouth of the Colorado was given in 1764; the author, after describing the poverty of the country, referred to the Papago as eating "seeds of forage, herbs and wild fruits, and even rabbits and rats." Also, "Papagos is the name given by the Pimas to those particular Pimas who live in the desert as far as Tucson and . . . up to the Gila, living on seeds, grass, rabbits, rats and wild fruits."[34] The same reference laments the poverty of the Papago country, stating these Indians at times went to the villages of the other Pimans where they worked as servants merely for their food, even going as far as San Ignacio and Dolores; they were so fond of meat that they ate horses and burros, and in returning to their lands even stole and ate dogs. Pfefferkorn,[35] too, describes the inferior basis of Papago subsistence.

In the Papago country permanent sources of water in association with tillable land are rare. This situation necessitated a compromise between sedentary life in villages and a migratory existence which expressed itself in seasonal movement usually between two kinds of villages. Those known as The Wells were situated at permanent sources of water in the mountains or foothills. The other type of village, designated The Fields, was in the open desert country adjacent to the cultivated areas, and twenty to thirty miles distant from their winter villages. Papago semi-nomadic life thus was not dictated primarily by the needs of hunting or agriculture but to

[34] *Documentos*, 3rd ser. IV, 554, 638; *Rudo Ensayo*, pp. 189-90.
[35] Pfefferkorn, *Beschreibung der Landschaft Sonora*, I, 10-12.

5: Castetter & Bell N-5 (1938-1940 1942
NU28 Papago NU28

174 get actual drinking water. Even so, permanent springs were
361 widely scattered, and the women spent more time fetching
312 water than gathering food. Such scarcity of water also had its compensation, for it was the Papago's best defense against the plundering Apache.

During winter, families camped as near as possible to a spring, water hole or *tinaja*, as exemplified along the western foothills of the Baboquivari Mountains and at Comobabi. But even this sometimes involved a daily trip of three or four miles, occasionally as much as ten, to fetch water, chiefly by the women. One Papago informant said that as a boy he had to make a daily trip of fifteen miles on horseback to secure water, carrying two ollas, each holding about three gallons. These water holes were not only sources of drink but of game, for here it was possible to stalk deer, antelope and mountain sheep. In places, water was secured from a very small spring where an olla had to remain under the drip for as long as half an hour, and in such cases women stood in line and sometimes had to spend the night, this constituting a social occasion. A few springs were large enough to be called wells, such as Badger Well in the Comobabi Mountains. The Papago enlarged it by building fires under its rocky walls to crack off the rocks. Occasionally a water supply at these winter villages was to be had only by patient digging in the sandy washes on the mountain pediment, and then at times in very small quantities along a plane of contact between sand and stone after scraping the sand away.

Families usually did not move down to the Fields until the heavy rains had begun, so as to be certain that drinking water would be found in the depressions which had been dug near each farming village, a fact noted by Font and by Garcés.[28] Such migration between the Fields and the Wells continues today, especially in the western half of the reservation. Often there were natural water holes or pools of

[28] Bolton, *Kino*, IV, 52; Coues, *op. cit.*, p. 64.

5: Castetter & Bell N-5 (1938-1940) 1942
NU28 Papago NU29

standing water of variable size along channels where flood waters spread out over adobe flats and washes, in which case they were known as *charcos*, usually three to five feet deep. Dikes and ditches were sometimes constructed to assist in trapping and impounding the surface water in such depressions. At times small earthen dams or *represas* were constructed, usually in adobe flats, to impound flood waters for household purposes, later for the use of stock.[37] Such pools retained water from a few days to several months and on the whole remained available until October or November, when the deer dance closed the agricultural season. Mange[38] observed that the Papago at El Gubo had a small spring from which they drank, and that the Sobaipuri at Correa on the Santa Cruz got their drinking water from a deep well made in the cass of the river, but which was at this point evidently dry most of the time, as their agriculture was *de temporal*. Such easy seasonal access to water freed the women for food gathering, essentially a summer occupation. Before the time of wheat cultivation and the digging of government wells, the Papagos lived at their *temporales* during the summer months only, but now, with dependable sources of water and the necessity for sowing wheat in fall, the aboriginal situation has been greatly modified, and the seasonal migration between Wells and Fields has lost its importance. Formerly the village of Kaka depended wholly upon its *charco*, and when this dried up the Indians were compelled to move or fetch water from Moivavi, sixteen miles distant in the mountains.[39]

Obviously such natural limitations precluded permanent homes and formal and elaborate equipment, and gave expression to a type of economy characterized by small groups of peaceful, industrious, skilled agriculturists, meagre in equipment, and informal and decentralized in organization.

[37] Bryan, *Papago*, pp. 181, 257.
[38] Mange, *Luz*, pp. 250, 258.
[39] Hoover: *The Indian Country of Southern Arizona*, p. 52; *Generic Descent of the Papago Villages*, p. 259.

5: Castetter & Bell N-5 (1938-1940 1942
NU28 Papago NU28

174 Papago agriculture, involving no storage of water, was 244 characteristically of the primitive but efficient *de temporal* 312 "thunderstorm" type; that is, flood-water farming in which seed was planted in moist ground at the mouth of a wash after the first rains, which came in summer. This was reported as early as 1694 by Mange[20] at El Tupo, Tucabavia and Gubo, and there is a specific statement[21] to the effect that this was the customary method of planting by the Papago north of Casas Grandes. Kino reported the same for the Papago at San Rafael del Actúm Grande.[22] Although Gaillard[23] observed in 1894 that the Papago irrigated their crops with water drawn from natural or artificial dams, which he terms respectively *charcos* and *represos*, we have been wholly unable to confirm this practice, all our information being to the effect that such stored water was used only for domestic purposes. He gives the impression that this was the customary method of watering crops and makes no mention of flood-water farming. Bryan[24] points out that the difficulties of profitable storage of water in sufficient amounts for irrigation in the Papago country are very great. Also he has informed us in personal correspondence that he has seen no evidence that the Papago ever stored water for irrigation of fields.

174 To be sure, Papago agriculture was quite uncertain due 241 to irregularity of the rainy season, then later on account of Apache raids. In years when rains were late these Indians lived entirely on wild foods without planting at all. So tenuous was Papago agriculture that Mange,[25] head of a military detachment detailed to escort Kino, in a number of places asserts that in the late seventeenth century certain *rancherías* in Papaguería had no agriculture, living entirely on wild

[20] Mange, *op. cit.*, pp. 215, 229-30.
[21] *Documentos*, 3rd ser., IV, 833.
[22] Bolton, *op. cit.*, I, 309.
[23] Gaillard, *The Papago of Arizona and Sonora*, p. 295.
[24] Bryan, *op. cit.*, p. 143.
[25] Mange, *op. cit.*, pp. 216, 225, 283, 286-87.

5: Castetter & Bell N-5 (1938-1940) 1942
NU28 Papago NU28
Pima NU29

Mexicans they more and more came to use Mexican goods and to pay less attention to agriculture, thus the arrangement of family geographic units was disrupted.[40]

In lean years among the desert Papago the bulk of the harvesting on Pima farms was done by the Papago, and the custom of such labor for hire has continued until quite recent times. However, desert Papago almost invariably returned to their homes later as it was very rarely that these Indians lived outside their own village except by intermarriage. In ancient times the Pima usually had a rather large and dependable crop, but Pima agriculture was given a strong stimulus beginning with gold rush days in the fifties, and by the eighties the increased penetration of whites created a demand for crop production on a commercial basis. Thus the Papago almost abandoned the northern part of their desert territory to work for the Pima during wheat harvest on the Gila. This was always a great boon to the Papago for whom this time was the leanest part of the year. Here they remained for about a month, a fourth of which was spent trading and cutting willow for making baskets. For their labor the Papago were given daily food and a share of the crop. Although May and June, the time of wheat harvest, constituted the period of greatest Papago movement to the Gila, some of these Indians returned in late fall to assist in planting, and to pick cotton.

Despite the hiring of Papagos by the Pimas, due to commercial growing of wheat by these Indians, the northern Papago villages continued to be agricultural, adding the raising of cattle to the extent of supplying the amount of meat formerly secured by hunting. Moreover, here the arrangement of family geographic units remained intact.

One must not get the impression, however, that irrigation was a culture trait characteristic of Pima, Sobaipuri and Soba, but lacking among Papago. These peoples were one in speech

[40] Underhill, *op. cit.*

5: Castetter & Bell N-5 (1938-1940 1942
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and general culture, the Papago simply being environmentally differentiated Pima, "desert Indians with an agricultural heritage," who dwelt in a land where running water for irrigation was not available. Desert conditions therefore imposed upon them a different way of life in a land where agriculture could be naught else but marginal. In this connection Bryan[41] has pointed out very fittingly that the usually clear distinction between irrigated and unirrigated farm land breaks down in the consideration of marginal lands irrigated by flood water, in some cases there being a complete transition. Papago fields were situated at the mouths of washes fed intermittently from desert mountains, and here they utilized to the utmost, in their primitive but efficient manner, the extremely meagre and precarious agricultural opportunity made possible only by summer rains. Thus with an average precipitation of less than five inches the Papago cultivated and continue to cultivate their basin lands with an incipient system of irrigation.

Moreover, irrigation was reported in those areas inhabited by Papago where there were running streams. Thus at San Marcelo de Sonoita, with its good arroyo of permanently running water and many good springs in the vicinity, the Papago, toward the close of the seventeenth century, were practicing irrigation by means of ditches leading from the arroyo, as they did at a *ranchería* near Caborca;[42] and Anza,[43] three-quarters of a century later, noted that these Papago at Sonoita and Quitobac were still irrigating small pieces of land with running water from springs. The village of Sonoita was a favored site as the Sonoita River is here a permanent stream. Irrigation was also possible from the waters of the large fissure spring at Quitobaquito, a veritable small oasis. It should be explained that the Sonoita River is the only interrupted stream rising in the Papago country. Drainage

[41] Bryan, *Flood-water Farming*, p. 444.
[42] Mange, *op. cit.*, pp. 262, 285; Bolton, *op. cit.*, pp. 188, 225, 255.
[43] Bolton, *Anza*, II, 22, 148, 150.

5: Castetter & Bell N-5 (1938-1940) 1942
NU28 Papago NU28
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from the Baboquivari and Quijotoa valleys runs by a circuitous route through the Great Plain and unites with similar ephemeral streams in Sonora to form the Sonoita. Except for occasional floods the channel is dry for more than twenty-five miles to a point a short distance above Sonoita.[44] Similarly, irrigation was practiced at San Xavier by the Papago who occupied this village after the Sobaipuri had abandoned it within historic times. Maps in Bryan's[45] report and those in Hoover's paper show in parts of the Papago-Pima country the location of fields, streams, washes, springs, tanks, *represas* etc.

The Papago continue to the present to pursue their *de temporal* farming much as they have always done, although Pima agriculture has undergone marked changes. The Federal Government, beginning in 1918, drilled wells in a number of Papago villages and such wells are now scattered throughout Papago territory, but they are used for watering stock and enabling residents to remain throughout the year, and have no bearing upon the growing of crops. In 1919[46] the desert Papago in Arizona were reported as flood-water farming about sixteen thousand acres of land, while those at San Xavier had about fifteen hundred under ditch irrigation, with water largely from wells.

Three changes in Piman life, affecting both Pima and Papago, have been of the utmost importance in ameliorating their economic condition, even though the concomitant white influences have resulted in pronounced deculturation, notably among the Pima. The first of these was the introduction of foreign crops. The earliest to be received, and the most important for both peoples, was wheat. This provided an off-season crop, planted anywhere from mid-November to early February, depending upon the winter rains, and har-

[44] Bryan, *Papago*, p. 119.
[45] Bryan, *ibid.*; Hoover, *The Indian Country of Southern Arizona*.
[46] *Report of the Commissioner of Indian Affairs* for 1919, pp. 279, 287, 289.

5: Castetter & Bell N-5 (1938-1940 1942
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ested in May or early June. This also provided a more equable seasonal distribution of farm work and furnished a crop at a period of the year which heretofore had been very lean. The Papago for a long time, however, cultivated only small amounts of wheat and it has been only within the last few generations that wheat cultivation has deeply affected them. The second is the digging of government wells convenient to many of the *temporales* and farms (beginning in 1913), in some cases with a resultant development of permanent villages around them. This also has meant termination of the annual migration to the hills which had been such a potent influence in Papago life; moreover it has made possible a more sedentary life with a sanitary water supply, and the inhabitants of villages with such wells are usually more progressive and more prosperous. Important among these changes was the third factor—introduction of cattle. While this has been a boon to the Pima, it has been of more importance directly to the Papago, particularly in the eastern part of the reservation, where the stand of grass is better and the Papago now graze cattle for both home consumption and market. A pastoral economy is well suited to a scattered population such as the Papago. Cattle did not become important among the Papago, however, until the latter part of the nineteenth century. In the southern part of their area, where they had had cattle since Kino's day, several large ranches grew up, but in the north, which retained its ancient economy in a purer form, the raising of cattle was adopted more slowly. When the Jesuits left the Piman territory many of the domesticated animals went wild. Thus these Indians early had an opportunity to secure horses and cattle—a practice which began in Kino's day.[47]

By 1904 the Papago in southwestern Pima County were making their living chiefly by stock raising, while in 1908 many in Fresnal Valley were reported as having cattle, upon

[47] Mange, *op. cit.*, p. 146.

5: Castetter & Bell N-5 (1938-1940 1942
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Irrigation

When Kino and Mange,[21] in 1687, made their first explorations in Pimería Alta, the Pima on the Gila and the Sobaipuri in the San Pedro and Santa Cruz valleys were carrying on agriculture by means of irrigation from canals and ditches, a fact later noted by Anza (1774), Díaz (1774), Font (1775), Garcés (1776), Emory (1846) and Bartlett[22] (1848-62) for the Gila Pima.

Haury[23] reports that the Hohokam, who preceded the Pimans in the Gila Basin, are known to have practiced canal irrigation as early as 800 (?) A. D. His excavation of a portion of the Snaketown Canal reveals the superposition of three canals, number two having been dug in part out of the sediments filling the first canal, the third channel being excavated into the silt of the second.

Testimony of the early explorers indicates that the Piman canals formed a veritable network and were much larger and more extensive than required. Nevertheless, Haury states the maximum size and greatest scope of systems of the Hohokam canals was rather definitely reached about 1200-1400 (?) A. D. After this the systems dwindled, ending in the comparatively small but efficient Pima ones seen by the explorers of the seventeenth to nineteenth centuries cited above. These were very largely on the south side of the river. When Kino and Mange[24] first encountered the Pima on the Gila and the Sobaipuri on the San Pedro and Santa Cruz, they were carrying on agriculture by means of canal irrigation; Font and Garcés,[25] in 1775, referred to an extensive system of ditches among the Pima of the Casa Grande-Casa Blanca region, and Emory,[26] in 1846, was "impressed with the beauty, order and

[illegible]

21 Bolton, *Kino*, I, 205; Mange, *Luz*, pp. 248-49, 256.

22 Bolton, *Anza*, II, 19, 305; IV, 43; Coues, *On the Trail*, I, 107-08; Emory, *Notes*, p. 83; Bartlett, *Narrative*, II, 232.

23 Haury, in Gladwin *et al*, *Excavations at Snaketown*, I, 57-8.

24 Bolton, *Kino*, I, 205; Mange, *loc. cit.*

25 Bolton, *Anza*, IV, 43; Coues, *op. cit.*, p. 107.

26 Emory, *loc. cit.*

5: Castetter & Bell N-5 (1938-1940) 1942
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ditches by carrying baskets of dirt, a fact noted by Whittemore[44] for the Pima in 1893.

The Pima leveled their fields by carrying baskets of soil from high spots to fill the low ones. Small irregularities were often leveled by flooding the fields when the river was carrying a heavy deposit of sediment.

Over a period of time the Federal Government has supplemented the supply of irrigation water among the Pima by drilling wells on the Gila River Reservation, the first experimental pumping plant having been installed at the Sacaton School Farm in 1904. The Pima do not regard this as very successful since the well water carries a fair amount of salts, and lacks the soil-enriching sediments carried by the silty flood water of the Gila which also improves sandy areas although it penetrates poorly. Despite the fact that the average salt content of the Gila underflow is greater than that of the surface flow, the underground water at Sacaton is regarded as better for irrigation than the average surface water of the Gila.[45] Pumped irrigation water has the advantages of being free of noxious weed seeds, soaks in more deeply and carries out the salts more effectively. The rather clear stored water would be preferable to both except for carrying weed seeds.

Canal Irrigation Among the Papago

One must not suppose that irrigation was a Pima-Sobaipuri trait lacking among the Papago, and that flood-water farming was characteristic of the Papago and not found among the Pima and Sobaipuri. These peoples were one in speech and general culture, the Papago simply being environmentally differentiated Pima whose desert land presented no opportunity for river irrigation. Thus all Pimans who dwelt in areas remote from the rivers necessarily pursued flood-water farming. Moreover, as pointed out in Chapter III, in

[44] Whittemore, in *Among the Pimas*, p. 58
[45] Lee, *Underground Waters of Gila Valley*, pp. 61-2.

5: Castetter & Bell N-5 (1938-1940 1942
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those Papago areas where there were running streams ditch irrigation was practiced, and that this was done aboriginally is clearly shown by Haury,[46] who found traces of ancient canals on the Sells Reservation. One such canal runs in a straight line for seventeen miles in a west by southwest direction from Baboquivari Mountain to the vicinity of Vamori, and is dated as functional in the fourteenth century. A site excavated during the winter of 1939-40 shows a short canal about a half mile long, with strong indication of water diversion from a ditch, also evidently in use during the fourteenth century. Clotts[47] states there is evidence of prehistoric irrigation indicated by old ditches and reservoirs at Santa Rosa, and within recent times the Papago have dug irrigation canals in suitable places to conduct water to their fields. About 1914 they constructed at Cocklebur a canal three miles long with a base width of fifteen feet and a depth of four feet; at Kowlic, nine miles south of Sells, about twenty-five years ago they built a canal fifteen feet wide, three feet deep and a half mile long to take water from the wash for irrigation. Also at Quajote water is taken for irrigation from Copperosity Wash. Lands were irrigated by the Papago from the large fissure spring at Quitobaquito on the Mexican boundary as well as at San Marcelo de Sonoita, at Caborca and Quitobac.[48]

In the western canyons and foothills of the Baboquivari Mountains lie fourteen winter villages, or Wells, at an altitude of about three thousand feet. Of these Fresnal is a very large village, the houses extending about four miles up Fresnal Canyon. The old Baboquivari Valley village was Komalik, with its ancient winter well at Comobabi, in Sonora. However, nearer winter villages have developed in the Baboquivari Mountains, the most important of which is Fresnal.[49]

[46] Emil W. Haury, Personal conversation, April 26, 1940.

[47] Clotts, *Nomadic Papago Surveys*, p. 82.

[48] Bryan, *Papago*, pp. 324, 407; Clotts, *op. cit.*, pp. 44, 49, 75; Davis, *The Papago Ceremony of Vikita*, p. 164.

[49] Hoover, *Generic Descent of the Papago Villages*, p. 261.

5: Castetter & Bell N-5 (1938-1940) 1942
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Mange[30] wrote of a flowing stream near a high, square *peñasco*, visible for eighteen leagues, which he and Kino visited in 1699, and Bryan is of the opinion that Mange's description seems to apply to no other locality. Here many Papagos lived during the dry season, some remaining throughout the year. In 1915 there were in this canyon small enclosed gardens totaling thirty-five acres, planted to beans, melons, chili, tomatoes and corn. There are no permanently running streams, Fresnal Creek being one of the best, and it runs only for a short time after heavy rain. Part of this acreage was irrigated by water drawn from shallow wells, which up to 1915 were dug by the Indians themselves, and the rest of it was planted to early crops, matured by rainfall alone. There is no evidence of aboriginal dams, wells or other irrigation activity.[31] It is very doubtful, therefore, whether any of the irrigation in Fresnal Canyon represents an aboriginal condition.

Irrigation aboriginally was carried on at San Xavier, the only anciently irrigated village now on the Papago reservation. In Kino's day this was occupied by Sobaipuri who, during the eighteenth century, seem to have died out from some contagious disease, and the Papago have gradually moved in and cultivated their fields. Irrigated agriculture was pursued by utilizing water from springs and, later at least, the flow of the Santa Cruz. One of the sources, a spring issuing near the village and known as the Agua de la Misión, was destroyed by an earthquake in 1883, which forced this flow to the surface farther up the valley. It is now located 1.7 miles south and 0.8 miles east of the mission. The second source of water for irrigation, known as the Acequia de la Punta de Agua, is first mentioned in a Mexican grant of 1851, in which it is related that José Martínez first developed and brought water

[30] Mange, *op. cit.*, p. 67; Bolton, *Kino*, I, 195.

[31] Cloots, *op. cit.*, pp. 52-5; H. V. Cloots, Personal correspondence, July 17, 1941.

5: Castetter & Bell N-5 (1938-1940 1942
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upon his land.[32] This would indicate construction of an acequia, or ditch, which probably tapped seepage water at a shallow depth, and this method was continued by the digging of additional surface ditches until a large channel was cut through the level plain, making it impossible for the Indians to secure water any longer by this means. This gradually became so serious that, by 1912, the installation of pumping plants was initiated. Our one informant at San Xavier said that formerly the Papago cultivated only small patches here, that there were two springs and the water from them combined to form a stream about three feet wide and three deep, which at times filled up with grass and weeds and had to be cleaned out.

Thus aboriginal irrigation at San Xavier seems to have been carried on partly with spring water, the indication being that the Indians utilized small springs or seeps. These were supplemented by the natural flooding of the Santa Cruz, and this valley was covered with grass and mesquite as late as 1873. There was formerly no definite river channel, except probably above the dykes, and during annual floods the water spread out in a thin sheet over the valley. Hence, as rain did not run off quickly and floods were not so great in volume as later, their main effect was that of a thorough irrigation rather than of erosion and destruction.[33] Diversion of the flow of this river in flood season by means of a brush dam evidently has been a development within historic time.

It is difficult to understand Kino's statement in 1689 that at San Xavier "The fields and lands for sowing were so extensive and supplied with so many irrigation ditches that the father visitor said they were sufficient for another city like Mexico,"[34] for there is no reason to believe the cultivated

[32] Olberg and Schanck, *op. cit.*, p. 110; Cloth, *History of the Papago Indians*, etc.

[33] Olberg and Schanck, *op. cit.*, pp. 5, 7.

[34] Bolton, *op. cit.*, p. 205.

5: Castetter & Bell N-5 (1938-1940) 1942
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area was very large.[55] J. M. Berger,[56] Farmer in Charge at San Xavier, in his special report, August 14, 1900, wrote that the Indians there had fully four times as many acres of land under cultivation as they had fifteen or twenty years earlier, although with a very much smaller water supply than was ever known to exist. The land under cultivation was given in Berger's several annual reports as 800 acres in 1890 (Olberg and Schanck[57] state 1,580), 950 in 1897, 1,040 in 1899, and 1,200 in 1902. After wells and pumps were installed, beginning in 1912, the following acreages are listed: in 1915, 500; in 1917, 500; in 1919, 1,500; and in 1920, 1,121 acres. On this basis the amount of land under cultivation in 1880 was approximately 250 acres, and this estimate is given credence by McDowell.[58] Our informant at San Xavier advised there is now much more land under cultivation than formerly.

The first European stimulus to increased irrigation at San Xavier occurred with the arrival of Kino at the close of the seventeenth century, but there is no indication that extensive areas were cultivated or greatly improved methods used. It was not until the more prosperous periods from 1768 to 1822 that there was any considerable development of irrigation at favorable points along the Santa Cruz near the mission of San Xavier and the Spanish presidios of Tubac and Tucson.[59]

Several factors have contributed materially toward deepening the river channel, thus rendering it increasingly difficult to utilize the water for irrigation. One is the introduction of numerous cattle into the area during the last quarter of the nineteenth century, the resultant overgrazing contributing toward erosion in the valley. As ranching became

[55] Velasco, in his *Geografía y Descripción Universal de las Indias* covering 1571-74, p. 189, reported that at that time there were three thousand Spaniards and thirty thousand houses of Indians *(Casas de Indias)* in Mexico City.
[56] Clotts, *op. cit.*, p. 65.
[57] *Ibid.*
[58] *Report of the Board of Indian Commissioners* for 1919, pp. 67, 73, 77.
[59] Olberg and Schanck, *op. cit.*, pp. 7-8.

5: Castetter & Bell N-5 (1938-1940 1942
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312 more common, attempts were made to develop ground water at several points. The underground-water development which brought about the greatest damage was made by the whites about 1890, six miles below Tucson, when they opened trenches to intercept ground water. By 1912 the channel had eroded upstream eighteen miles to a point three miles inside the reservation, resulting in the destruction of about one hundred acres of Indian farm lands. A third factor was the improper methods used for securing water for irrigation during the second half of the nineteenth century. For example, development of the water source known as the Agua de la Misión caused a channel one to two hundred feet wide by fifteen to twenty feet in depth, extending about two miles up the valley. To collect the water, an earth dam was thrown across the channel, but this washed out at every flood. In 1912 practically all the irrigable land under cultivation (about five hundred acres) lay on the west side of this channel, about half of it being irrigated from a canal heading at the dam.[60]

In constructing the Acequia de la Punta de Agua a channel resulted extending from sixty to one hundred feet wide and six to twenty feet deep, and came to be known as the west-side barranca. In 1912 a ditch leading from the lower end irrigated the remainder of the five hundred acres. At that time this channel extended upstream for approximately two miles, at which point it was about twenty feet deep, and there encountered a deposit of caliche which checked erosion. In 1912 there were four canals in the vicinity of San Xavier, providing an uncertain supply of water.[61] The entire irrigation system, extant in 1912 as well as that proposed, is shown in a map in Olberg and Schanck's paper.

For some years the Santa Cruz has been a swollen flood at San Xavier during the rainy season of July and August, covering farm lands and causing much destruction, but for the

[60] *Ibid.*
[61] *Ibid.*

5: Castetter & Bell N-5 (1938-1940) 1942
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rest of the year it has been a shallow, uncertain stream meandering between high banks, or at times completely dry. 312

The deepening of the river channel and consequent lowering of the water table, with its decrease of available water for irrigation, beginning about 1890, gradually became worse, and, in 1908, agitation was begun to alleviate the situation. In the fall of 1912 the channel of the Santa Cruz was completely choked with sand, and a temporary pumping plant was installed two and one-half miles above the Agency to supply land on the east side of the river. The only available water other than that developed at the pumping plant was a flow from the east channel of the river, making a total sufficient to irrigate 750 acres.

During the heavy floods of 1914 and 1915 the erosion of reservation land by flood water of the Santa Cruz became so pronounced that immediate action was necessary to preserve the Indian fields. Therefore, in 1915, a long levee was thrown up, a number of wells drilled and pumping stations installed to supply the necessary water for irrigation. In 1916 the largest crop ever grown on the reservation up to that time was harvested.

As to Papago living on the Maricopa Indian Reservation just south of Maricopa, Arizona, little can be said. J. J. Grenville, Superintendent of Irrigation, in his report of April 20, 1911, makes mention of about one hundred Papagos [731] near Maricopa who were on the verge of starvation owing to two successive dry seasons, when their crops were a total failure, although they had under irrigation one hundred acres at the time of his report.

At Akchin, about three miles southwest of Maricopa, is a settlement of approximately 120 Indians who came there about 1874 from Maricopa Wells, eight miles northwest of Maricopa; their fields at Maricopa Wells had been irrigated by flood waters of the Santa Cruz, and were so impregnated with salts as to be unproductive. At the new location they supplied about 180 acres with flood water from the Akchin

5: Castetter & Bell N-5 (1938-1940 1942
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3/2 Wash, although the uncertainty of the source rendered cultivation precarious, especially in years of drought. Therefore, in 1914-15, the Federal Government drilled a number of wells, and now water for irrigation is supplied by pumping.[82]

Flood-water Irrigation Among the Desert Papago

Bryan[83] has pointed out that the usually clear distinction between irrigated and unirrigated farm land is not valid in its application to marginal lands irrigated by flood water, there being, in some instances, a complete transition. The Papago practiced an incipient sort of irrigation to the extent that their desert environment permitted. (For other aspects of Papago flood-water farming see Chapter III.) In their country the run-off of the mountain areas collected in streams with well-defined channels, which, on reaching the large undissected alluvial basins, lost their momentum and spread out in broad sheets over the level land for a square mile or more. Places where this spreading occurred were known to the Papago as Akchin, "arroyo mouth." These were favorite locations for flood-water fields, and at least six once-inhabited villages in the Papago country of southern Arizona and Sonora are named Akchin or some modification of it. In many cases shallow ditches and dykes, or wings, were constructed starting a mile or more from the fields in order to collect the surface run-off for the few acres on which they converged. Low embankments, small brush dikes and short shallow ditches were used where necessary to control, divert, distribute and retain water. At times embankments were disposed as levees, somewhat after the manner of borders around a field, to retain water until it could soak into the soil, but this was not common. For some fields water was led out from the arroyo by ditches, a deliberate effort thus being made to conduct the flood water to the fields. At present earth dikes,[84] protected in front by brush supported by stakes,

[82] Clotts, *op. cit.*, pp. 85-7.
[83] Bryan, *Flood-water Farming*, pp. 444, 449.
[84] *Ibid.*

5: Castetter & Bell N-5 (1938-1940) 1942
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are often thrown across washes to divert flood water, but there is no indication that this was an ancient practice. Ditches from the wash to fields usually ended somewhere in the middle of the field, an effort being made to construct such ditches over the higher portions so the water would cover the entire plot. If there were several fields, a main ditch with several laterals was employed. A certain amount of leveling of fields resulted from the deposition of sediment by flood waters, but the bulk of it was done by carrying dirt in baskets from high to low spots or off the field entirely. As there was an abundance of water during the short time it ran, there was no need to regulate the size of ditches, hence no reservoirs or flood gates were used. Care had to be exercised to locate fields so that each flood would give them a good irrigation but not wash out the crop during heavier floods, although this always could not be avoided. Each man looked after the ditches and dikes serving his own land, but if these supplied the fields of several families the men concerned worked on them jointly. Most Papago farming villages were quite permanent, but the area cultivated might vary slightly from year to year due to erosion. However, informants said there was little of this anciently, but if there were signs of erosion in a field immediate steps were taken to stop it. Within the last thirty years the Federal Government has installed on this reservation a number of pumps to supply water for irrigation.

Excellent examples of primitive flood-water farming are to be seen at Hardimui and Pisinemo; examples of large cultivated areas are found at Big Fields, the Santa Rosa Valley (Santa Rosa, Anegam and Akchin), Ko-opke, Topawa, San Miguel and Vamori.

At present, a method of irrigation from a *balsa* is employed in several places among the desert Papago. This *balsa* is a sort of embanked reservoir, supplied through a gate which allows water to enter from an arroyo. When filled to overflowing, a depth of about two and one-half feet, the water is allowed to go into a ditch through a gate on to the

5: Castetter & Bell N-5 (1938-1940 1942
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Pa 312 land, and it is possible to raise a crop from the water of a single filling of the *balsa*. In 1939, a planting of teparies, soybeans and cowpeas was made August 26 at Sells, under *balsa* irrigation, and a good crop resulted. Papago native corn, a milo maize, wheat and Sacaton June corn (for fodder only) have also been matured in this way. The original cost of irrigating on this basis is about one hundred dollars per acre. A modification of this system has been found among the Sand Papago, who lived in northwestern Sonora, near mountains where the reservoir was supplied from permanent springs. A ditch leading from the reservoir completely surrounded the fields, and laterals crossed them at intervals. Water collected in the reservoir during winter and early spring was released in June, before the rains began, in order to make an early planting possible. The reservoir might be filled and emptied several times during the season. The *balsa* is not aboriginal, but it has not been possible to determine whether the arrangement used by the Sand Papago is native.

Number of Irrigations

Pi 312 Among the Pima, planting customarily was done only after the ground had first been irrigated, or if already moist from rains. After irrigation, the soil was allowed to dry out for six or seven days, then planting began.

The Pima did not irrigate crops any specific number of times but carefully watched the condition of plants and soil, then irrigated accordingly providing water was available. In general, three to five irrigations were necessary to mature a crop, although because of water shortage it often happened that the heavy irrigation preparatory to planting was all the crop received. It was possible to produce fairly substantial yields of the Pima native soft varieties and Santan Yellow flint corn with only one irrigation, due to their short period of maturity and low moisture requirements. In no case, however, was a crop irrigated until it was well started and up out

5: Castetter & Bell N-5 (1938-1940) 1942
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of the ground, otherwise the plants turned yellow or would even die. It was considered advisable to keep crops well watered while making their most rapid growth and until they began to set fruit, after which they needed less.

Papago informants said crops had to have three floodings in order to produce a good yield, two being the minimum, and that if corn, for example, did not receive two good floodings, plants on the higher parts of a field would produce no ears. Teparies were very hardy and gave a satisfactory yield with only two floodings, but pink beans were less drought resistant and required more moisture, although they would not tolerate an excessive amount. Water requirements for the various crops were seen nicely in a field belonging to Bernabé López at San Pedro village. On one high spot where it was difficult to get flood water he could produce a good crop of teparies and pink beans; these turned yellow if planted in the low spots with the corn and pumpkins.

Pima corn needed more water than teparies. Pumpkins were usually irrigated twice before setting of fruit, after which plants were never watered heavily, as a certain fungus would attack them, causing stem rot and fruit decay. (This we observed in our own irrigated plantings of Pima pumpkins in the Río Grande Valley at Albuquerque.) Care also had to be taken with young pumpkins. When fruit was about the size of a baseball each one was raised off the ground and supported by a piece of brush, stones etc., before irrigating, to prevent rotting from too much moisture. Although teparies were quite hardy and gave a good yield with two floodings, three or four produced a better yield with earlier maturity, and while quite drought resistant they would tolerate considerable moisture. Pink beans had a higher water requirement than teparies but would not withstand frequent floodings. They did not do well if water covered the plants and left a mud deposit on the leaves. Teparies tolerated more drought than maize, kidney beans or lentils, and maize required less moisture than pumpkins, more than water-

5: Castetter & Bell N-5 (1938-1940 1942
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melons. Informants were aware that, although chili requires considerable moisture, it usually dies when planted on flat irrigated ground, hence it was sowed on the sides of raised field borders in hills about eight inches apart. Pima and Papago grew chick peas as a winter crop, planting from November 1 to early December. Papago awaited the winter rains before sowing, while the Pima heavily irrigated the soil before planting and gave the plants comparatively little water afterwards. In no case were they irrigated after blooming began. Garden peas needed frequent watering and could be grown only where there was a permanent source. Wheat was usually irrigated about four times.

Neither Pima nor Papago carried water to plants (other than gourds, which were sometimes watered by hand) to tide over periods of drought, although informants had heard that the Maricopa did so.

Neither tribe had any ritual for irrigation. One Papago informant said getting water on the fields was not a matter of ceremony but of brain work.

Soil Fertility and Crop Rotation

Fertilization of the soil was not practiced aboriginally by either Pima or Papago, yet soil depletion to the extent of necessitating abandonment of fields was extremely rare. Pima land was continually replenished with mineral and organic materials deposited by the river in times of overflow; similarly, Papago fields were naturally fertilized by flash floods. The fact that many of the Piman fields have been under cultivation for hundreds of years, producing sustained crop yields without the addition of manures or other fertilizers, is evidence that considerable plant nutrients were carried by the waters used for irrigation in the Gila Basin. Allowing fields to lie fallow in order to build them up was unknown, although it was recognized that new ground produced larger yields than the old.

6: Densmore E-5 (1920) 1929NU28 Papago NU28

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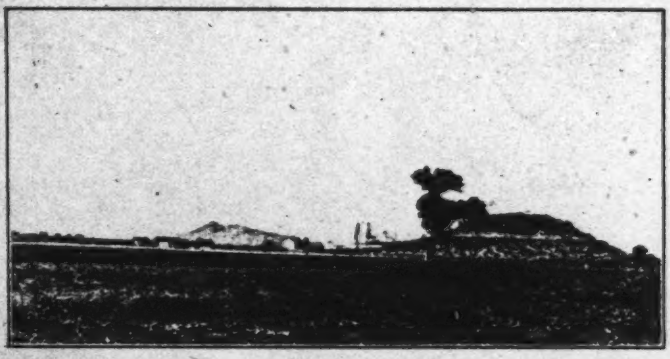

a, San Xavier village and mission

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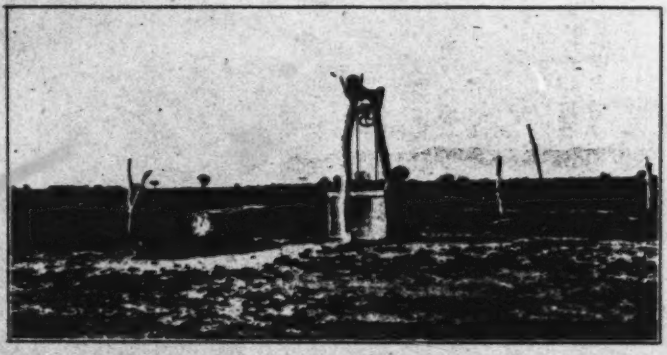

b, Well and water trough at San Xavier

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c, Papago house at San Xavier

7: Lumholtz N-5 (1909-1910) 1912
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missions furnished the troops with horses. In the Papagueria proper there were well-to-do missions such as Caborca, but the nature of most of that country would indicate that they were generally on a modest scale. There was one in Sonoita and two on the Gila River. In 1751–3 there was a revolt in Pimeria Alta, and in 1840 the Papagoes again revolted against the government.

With the expulsion of the Jesuits in 1767, and later of the Franciscans in 1828, the missions as well as the forts decayed and vanished. Changing political conditions in Mexico also contributed toward their disappearance. To-day the former missions interest few and are left to the archæologist to trace. Such has been the fate also of the missions among the Yaqui, Opata, and Seri Indians.

As for the Papago, the greater part of the tribe never could be induced to live in pueblos, or villages, which was always the policy of the Spanish missionary. In spite of the efforts of the Jesuits and Franciscans, the Papagoes are still living in their *rancherias* as of old, half nomadic in habit, resorting in the winter to the sierras where water is more plentiful and where their cattle, horses, mules, and donkeys find good grazing ground. In the summer they move to the broad, flat valleys to devote themselves to agriculture which is made possible by the aid of the showers that fall in July and August. They do not usually pursue irrigation beyond the diverting of rain water into ditches. In the summer they raise maize, beans, watermelons, and squashes, and in the winter when infrequent light showers usually may be depended

7: Lumholtz N-5 (1909-1910)1912
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upon, peas, barley, and lentils may be planted, all on a small scale, according to Indian habits. Wheat, which is grown in November and harvested in May, is now the most important crop.

By scooping up the earth they make dams in which rain-water is stored for household use as well as for their domestic animals. This is especially the case at the summer rancherias. Of late years they have also taken to the digging of wells, going sometimes as deep as seventy feet, but they have been known to find an abundance of water at a depth of only eighteen feet. Thus the Papagoes, though sedentary Indians, have distinct habitations for summer and winter. The aboriginal name for the summer rancherias is *oóitak*, fields, called by the Mexicans *temporales*. The winter rancherias are called *kíbim*, where there are houses (*kí*), and these might be called villages. In some cases the summer rancherias seem to be considered the more important habitations, and medicine lodges are found at both.

As implacable enemies of the Apaches, the Papagoes were of some assistance to the early missionaries in helping the presidios to fight their savage foes, and they have several times, says J. F. Velasco, presented the government with ears and scalps of Apaches they had killed. Their innate enmity to the Apaches later gained them the favor of the Americans, who received their valuable assistance in campaigns against these marauders. They also gained the good-will of the Mexican Government by assisting in the war against the valiant Yaqui Indians.

It has been the good fortune of the Papagoes to live

7: Lumholtz N-5 (1909-1910) 1912
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The old man seemed glad to explain everything. He was also willing to sell me some of his treasures. One of them was a medicine-man's plume consisting of four eagle plumes tied together so that they diverged two by two. When used, these are held by the quill ends as a handle and moved in the air forward and backward as if dusting an object. When the young girls come of age they are "dusted" in this way from all evil. The implement was new and well made, and I wanted to buy it. "The plume is very valuable," he answered; "with us it is at least worth as much as a horse or a cow." He would, however, make it easy for me by letting me have it for $2.50. I presented him with a pouch of tobacco and a handful of candy, the cause of much interest to his little grandchildren who had been clinging to the good-natured old man all the time that he was explaining. He also promised to show me the so-called Montezuma's Cave, in the peak of Baboquivari, some day.

In a light wagon which Pablo borrowed we started on an excursion south, to be possibly extended beyond the border to Pozo Verde. The day was moist and warm. We passed several extensive summer rancherias or temporales as they are usually called. The rude fences of mezquite looked substantial and the Indian ranches gave an impression of prosperity. At two places there were dams also fenced in, but they were empty; they had been made by scooping up the rich soil with scrapers and horse-power. The water in such ponds lasts only three or four months and is not for irrigating purposes, but solely for the use of men and beasts. The

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361 Papagoes do not bathe in them; during the rains they
312 get their baths in the arroyos, men and women bathing
515 separately. There was not a soul to be seen anywhere, as the Indians were still at this time, the end of June, in or near the mountains with their cattle and horses.

133 From a lately established summer rancheria, called San Miguel, southward, the country assumes a different aspect, forming beautiful grassy plains or downs. The mezquites, far apart and small, take the place of greasewoods and the cacti have almost disappeared. There was an abundance of very dry grass of a whitish yellow hue. As the air was laden with moisture, it was to be expected that the coloring of sky and mountains would be fine toward sunset. The western sky beamed with the translucent color of light yellow or orange, while the mountains, which during the glaring light of the day had shown no color beyond a dull gray, appeared deep blue. Much more intense than the air-blue and complementary to that of the setting sun, the color extended to all the mountains around the great *bajio* (basin), while at its western edge a long narrow strip of light green, due to an unusual growth of mezquites, added to the variety. To most people it is not apparent that there is much coloring in any landscape except that caused by inherent qualities, as by vari-colored leaves of trees; if they would lie down on the ground and view the scenery horizontally, they would probably have their eyes opened from this unusual vantage point.

312 There is a well fifteen feet deep at a lonely Indian
361 ranch just on the border, but as the place was found to

7: Lumholtz N-5 (1909-1910) 1912
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be temporarily deserted, and there would be no one to look after our wagon, we had to abandon our intended trip to Pozo Verde, the largest Papago rancheria at the present time in Sonora. Its name, Green Spring, has the same significance in the Papago language, and the locality is important in the native mythology. Baboquivari rises about a thousand feet above the llano near the boundary line, losing itself in Mexico in low ranges and mountains.

On our return we made a détour into a rancheria called Sepánovak ("Smell of the Coyote"), which was situated in a narrow valley of the Baboquivari Range. It had been settled of late years and was small and unattractive. Discarded clothing was lying about, and the inhabitants looked like poor white people, although they owned lots of live stock. Judging from the fine looking fat horses and cattle down on the plains, a different opinion would have been formed of the owners; it was something like the disappointment one feels when a smart turnout of horses with driver and footman discloses ordinary-looking people inside the carriage. Natural and harmonious conditions are the only ones that count in life.

One interesting family, that of Ramon Cachora, lived a little further up the valley from here, he, his two sons and his son-in-law having been leaders in a religious movement of a white man's stamp. They were so-called educated Indians, and a daughter of his had been to Carlisle. It was an anomalous case, for, strange to say, they had become converts to the revivalism of the

7: Lumholtz N-5 (1909-1910) 1912
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him then, but during the following three days he worked at the drawing from memory in his spare time, being mostly occupied in his field and with his cattle. After long deliberation, he finally consented to part with the picture which is shown on plate. The horse is painted with red ochre and the necktie is blue, the color having been bought in an American store. The artist was about fifty years old.

Following a fairly good wagon road eastward through the Comobabi Mountains, I first halted at a rancheria called "Badger's Well," where I found all the old people absent in the sahuaro fields. The younger generation, inclined toward the white man's ways, offered little of interest. They spent much of their time in laughter and animated talk at the well, where they watered their cattle and horses. I noticed a quail creeping stealthily to drink from the overflow of the water, a few yards from the well. Its thirst was quickly satisfied, when it retired to safety among the bushes.

A man sold me a spur made from the cleft of a mezquite bush. It has a very sharp point, which is most efficient, though cruel. Only one foot is thus provided.

A negro came along, a rather strange appearance in this part of the country; he told of a silver mine four miles east of there that he and half a dozen of his race owned. It had been found by one of them who had been a prospector for eight years.

There were many ants in my camp, so I was glad to pack up in the morning. A visit was first made to the burial place, which was of the usual unattractive de-

7: Lumholtz N-5 (1909-1910) 1912
NU28 Papago NU28

ingly very strong. This implement, which is called *kiik*, 241
the same word as that for plough, had, according to my informants, been found in a mound in Santa Rosa valley. It is extremely rare, though I later succeeded in securing, mainly in the rancherias of Santa Rosa and Ánekam, ten specimens more which were kept in the houses of the Indians. It is not quite appropriate to call this implement a hoe, as it was employed solely for the purpose of weeding. Although I did not see it in active use, people in that section of the country know it very well. Probably it is occasionally still resorted to. The showers, which in that hot climate make plants grow very fast, bring forth in luxuriance weeds that, unless twice removed, would choke the crops. For the more recent innovation of wheat agriculture during the winter, one weeding is sufficient.

When in use the wooden hoe is held by both hands in a more or less horizontal position, the left hand around the handle, the right on the blade, while the bearer crawls on his knees and cuts in between the weeds, loosening the roots and turning them up. I found a simpler form of the same implement, smaller in size and consisting of a flat, oblong piece of wood with edge sharpened in a similar way, which was said to have been for the use of women.

On returning with milk which he had bought from 312
the friendly family, Pablo told me that Marianita, the young girl, had gone to the well for water, a mile away, and that I might have a chance to take a snapshot of her when she returned. After a while she appeared at a one

7: Lumholtz N-5 (1909-1910)1912
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CHAPTER VI

HORSESHOE IN THE QUIJOTOA RANGE—INDIANS AS MINERS —SPENDING A NIGHT UNDER DIFFICULTIES—DELIGHTFUL NATIVES—A WOMAN'S GAME—SANTA ROSA RANCHERIA—THE GREAT HARVEST FEAST OF SANTA ROSA

361
312 After an affectionate leave-taking from good Chief Alvina, we departed northward for Horseshoe, eating, as we travelled along, delicious pitahayas with which we had provided ourselves. Eight miles before arriving at our destination we passed on the llano the pump-house that had once been placed over a deep well, which, according to trustworthy information, is five hundred and twenty feet deep. It has an abundance of water from an undercurrent and was once the pulse of a short-lived, though intense, mining activity. If the information that reached me is correct, the discovery of a bonanza silver mine of very rich ore started a boom here nearly twenty years ago. Several thousand people gathered, the usual fabulous prices were paid for corner lots, and telegraph and telephone lines were established with Tucson. To-day the silence of death reigns here; the roads have been obliterated, the houses have disappeared, as also have the telegraph poles, and there is no sign of any former activity. I should have felt inclined to consider the whole thing a fable but for the unattractive remains of the pump-house, which the Indians have annexed, building a

7: Lumholtz N-5 (1909-1910) 1912
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few houses near it and naming their rancheria from the tall chimney. Five miles north is a rancheria called Sikulhímat ("where the water goes around." *Sikul*, round). Here, according to the Indians, the drainage of rain water flows toward the Gila River; south of that place it flows toward Mexico.

Horseshoe is the name of a once noted placer mine, the surface of which has been worked out. There are gold mines of a similar nature around the southern end of the Quijotoa Range. Judge Day has a store at Horseshoe and buys gold from the Indians, who still, during the winter, keep up the "dry-washing" process here, using for the purpose the machines that are common to the neighboring district of Altar, in Sonora. The Indians are even able to make the machines themselves. Judge Day is a man of intelligence and much common-sense, and, having lived here since 1893, was able to give reliable information about matters pertaining to the region. According to him the padres from San Xavier Mission, two hundred years ago, found the placer mines of Quijotoa. He showed me some nice nuggets of small sizes which he had lately bought. Five years ago the Indians found free gold in a piece of quartz which was worth one thousand six hundred dollars. After that eighty Papago and a few Yaqui Indians worked here for half a year, taking out in value between ten thousand and twelve thousand dollars, Judge Day buying most of the gold. The relations between the miners—all Indians—were cordial. When any of them had found a rich spot, he would tell it to the others, and next morn-

7: Lumholtz N-5 (1909-1910) 1912
NU28 Papago NU28

DESERT WILLOW IN BLOOM, JUNE

PAPAGO WOMAN CARRYING WATER

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THE DAM AT SANTA ROSA. MADE BY THE PAPAGOES

[Facing p. 120]

7: Lumholtz N-5 (1909-1910)1912
NU28 Papago NU28

great surprise by breaking down. Clemente, the Papago interpreter, tall and long-legged, immediately started on a fast run in order to overtake an empty wagon that five minutes before had passed us rather briskly on the llano. As he ran he fired three shots from his pistol to attract the driver's attention, and after an hour or more brought the wagon back. The goods were transferred and Clemente and I made our camp near Tajitos, a small gold mine, until our driver returned from Caborca with a new wagon, which he had managed to borrow.

We passed Norias, a gold placer mine, where a small number of Mexicans and one Indian family live. The Papagoes, both father and son, had discovered mines. The father's discovery had once been thought important, and he had received four thousand dollars for it, which was spent long ago in the usual light-hearted fashion of the miner. The old man, humorous and frank, consoled himself with the fact that he owed nothing and owned a wagon. Westward of this placer mine among the hills toward Cozon are many now abandoned gold-fields that yielded short-lasting but rich harvests to those engaged in "dry washing" the surface. Bonancita, San Perfecto, San Luis, and Hornitos are familiar names to the few who know the history of this part of the District of Altar.

At the Ranch Garambullo (the name of a thorny bush) are living six or seven Mexican families whose water supply is a dam which is not sufficiently large to serve beyond a limited time, when they are compelled to leave for other parts. Only one family, that of Sr. Santos

[pp 151-162 not processed]

7: Lumholtz N-5 (1909-1910) 1912
NU28 Papago NU28

312 There should be no great difficulty in making dams, and still less in sinking artesian wells. I was told of a very convenient place for a large dam in the low range north of Temporales, near the boundary line, three or four miles away. This valley averages eight or ten miles in width; a few miles east of Sonoita low mountains draw it together, but below that settlement it widens again. Only the middle part, at a width of one or two miles, probably more at certain places, is serviceable. There may be found a few sandy patches in certain localities, but, taking it all in all, this extensive stretch of tillable soil would be well worth investigating by people interested in agricultural pursuits, and one may expect at no distant date the reclamation of what is now practically a wilderness.

317 At the first Indian rancheria which we passed here, we found that some of the inhabitants had just returned from a salt expedition to the Salina de San Jorge on the Gulf. There were four full loads of salt lying scattered outside of one of the houses. The salt had been placed [492] in discarded flour sacks, two being carried inside of a packing bag of mescal fibre, which is slung over the back of the animal and constitutes a load. Coarse grass is wrapped around each sack for protection, and the bag when in use rests on two rolls of grass, which serve the Papago as pack or riding-saddle, as the case may be.

361 This summer rancheria as well as the next, called [312] Represa de Enrique, is quite populous. At the latter 609 place the Indians possess a large dam. Our arrival caused much excitement at first, due to a misapprehen-

7: Lumholtz N-5 (1909-1910)1912
NU28 Papago NU28

243 14, and sometimes it comes as early as the middle of October. However, frost does not injure maize that has reached maturity.

361 Before proceeding to Sonoita, which is only twenty-three miles from here, I made a trip south to Quitovac, where I expected to find mail-matter awaiting me. There used to be some gold mining here, but the houses that make up the only street are now mostly abandoned. Two or three Mexican families live there and a small store is maintained. The main population consists of Indians, who live all around, some of them being possessors of cattle and a few having small fields. It grew dark before we arrived, and while we were arranging our camp in the quiet evening a young Indian rode up like a whirlwind as fast as his horse could gallop, stopping as suddenly as he had appeared. This is the Mexican way of "showing off" or making oneself conspicuous, and was distinctly discouraging to one who was looking for primitive people. My two kodaks were lying on the ground and miraculously escaped his horse's hoofs.

● 312 The principal attraction of Quitovac is the sufficiency of water which at all times oozes forth in various small springs at the edge of the low mesa, so-called. The latter is a deposit of calcareous matter which a quarter of a mile wide stretches behind the houses for a mile and a half in the general direction from north-west to south-east. Fossil remains have been found here, as well as at a ranch, Represa, five leagues east, where in making a dam some large animal was encountered five feet below the surface. Also at Bánori and other places "bones of giants" have

7: Lumholtz N-5 (1909-1910) 1912
NU28 Papago NU28

312 been found which might bear palæontological investigation. At Quitovac Mexicans as well as Indians have dug about a dozen small ditches, the longest twenty feet, into the calcareous embankment for the purpose of giving the water freer egress. Judging from these cuts, the deposit, or mesa, rests here on fine sand at a depth of from six to eight feet only from the surface.

773 823 The Indians have a fabulous tradition that where this whitish deposit now rests there was once a square lake, in the middle of which lived a big animal that ate people. What kind of animal it was is uncertain for, as my informant, the oldest man there, said, "those who knew are dead." It was able to smell people at a great distance, and when travellers came that way they never returned to their homes, for they were eaten by it. In this emergency the Papago finally went to the cave where Íitoi lived in the Black Mountain (Pinacate) and asked him to help them. Íitoi said he would come and on the road he made ready his weapons (*váuk*), which were of hard stone, dark in color, and very large. He made four of them, and they were sharp and thin, being a kind of dagger or javelin.

"If the animal kills me, you shall see red clouds tomorrow, but if I kill the animal, you shall see white clouds," Elder Brother said as he entered the fray. The animal swallowed him, but he cut out its heart and made his way out through its flesh, and it sank to the bottom. Next day white clouds appeared around the lake, one at each corner of the world, and the people understood that the animal had been killed. Ever since the mesa has remained white, like the clouds.

7: Lumholtz N-5 (1909-1910)1912
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Sand Papago

184 seventy years ago—because the old men who had charge
796 of the ceremonial objects of the feast had died, and it was decided that the latter should be taken care of at Quitovac.

184 These sand people were intelligent, healthy, and able-
221 bodied, and managed to make a good living in an abso-
[147] lute desert. Their existence depended upon the knowl-
224 edge of the few places in the mountain ranges, not even
● [312] one in each range, where rain fills the tinajas, as well as of the few places along the coast where water can be found by digging for it. Once where to look for water is known, the difficulties in making a living out there are not so great as one would expect. In hot weather they followed jack-rabbits in the loose sand until the latter were exhausted, and caught muskrats by burning the accumulations of cactus spines with which those animals keep enemies away from their burrows. They also killed mountain-sheep, which were not a difficult quarry, with their bows and arrows, especially in the large craters, and they were even able to approach mule-deer and antelope near enough to kill them by the same weapon. Lizards were eaten. At certain seasons they went to the coast for the fishing, catching as many fish as they wished.

184 A single agricultural site may be attributed to the
241 sand people, called Sûvuk, south-east of Tinajas de Emilia, in Pinacate. Maize, squashes, and beans were planted here by means of a stick, on a very small scale, but the majority of these people had no agriculture what-
184 ever. They found good edible plant food in the dunes,
222 especially *ammobroma sonoræ*, the wonderful camotes

7: Lumholtz N-5 (1909-1910)1912
NU28 Papago NU28

103 361 *Arivaipa*, Mexican ranch, formerly Papago rancheria. In Papago, *Alivaipia* ("Small Springs" or "Small Waterholes." *Âli*, small, child; *vâipia* is plural of *vâxia*, well, waterhole, spring). Eight miles south-east of Garambullo ranch. The Papagoes used to have fields here. The old men died and the young men went to Arizona.

Arivaipa. Papago camp, abandoned; formerly of importance. It is about thirty-five miles east of Puerto de Libertad, fifteen miles from the coast. This marks the southern limit of the Papago tribes' extension. A reliable old Indian, Miguel of Quitovac, knows this place, of which Mr. M. Taylor, formerly superintendent of the Yaqui mine, gave me the following description: "A large mezquite tree is growing on the south side of the arroyo. Here the Papagoes from Pozos de San Ignacio used to camp before being dispossessed by the *rurales*. East of this tree, on the bank of the arroyo, is another mezquite overhanging the arroyo; one of the limbs has been cut off. Directly under that cut one should dig for water which will be found eight to ten feet deep in the sand; it stands in caliche, into which a two-foot deep hole has been made." According to the same informant, there is a Seri well, "Coyote," on the same arroyo, six miles from the coast. The main camp of the Seri Indians, perhaps now numbering two hundred in all, is said to be at no great distance from there.

[131] [312]

Arivaipa. This name also appears on the upper Gila River, near the San Carlos Reservation. Formerly the Apaches used to be there.

Atil, Mexican Pueblo, formerly rancheria. In Papago, *Átshi* ("Narrow Mountain"). Six leagues from pueblo Oquitoa on the Altar River.

Bajio de Evaristo, Summer Rancheria. In Papago, *Htashpik* ("Buried"). According to tradition, a beautiful Papago woman was buried here. It is situated in the fertile, long, broad valley leading west to Sonoita. About fifteen families live here.

Banori, Rancheria. In Papago, *Vânolik* ("Curve"). Seven miles east of Mexican rancheria Bajio del Alcalde, which hauls water from there. It is not far from the other Banori, both of them located near the boundary.

Banori, Mexican ranch, formerly Papago rancheria. Two miles west of Cobota. It is probably the ranch which formerly was called Pozo

11: Hoover U-4, 5 (ca. 1930) 1935
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It was the Sobaipuris for whom and by whom the Spanish missions were built. The picturesque and well preserved San Xavier Mission, about nine miles south of Tucson, was built at the largest village, Bac. The others were located at Guvavi, about nine miles north of Nogales, and at Tumacacori, midway between.

Fleeing before the ravaging Apache early in the nineteenth century, the Sabaipuris abandoned their villages and the missions, and took refuge among the Papago, with whom the tribe merged and lost its identity. The last one of the known Sobaipuri braves died in Tucson in March, 1932.[1] The present village at San Xavier was settled by Papago at a later date.

ECONOMIC ADJUSTMENTS TO THE LAND

Water, or rather its absence, is the critical factor or resource of the Papagueria; limiting in turn habitable sites where water may be had for domestic purposes; limiting the economically useful vegetation to short lived annuals and low scattered xerophytic perenniels suited to limited grazing; severely restricting the tillable lands in spite of extensive areas of flat land with deep fertile soils of the lime accumulating type. The rainfall varies from less than five inches in the west to as much as eighteen inches or more in the Baboquivari Mountains.

In recompense, the aridity has afforded a degree of security, for the area has offered little to hostile marauding Indians, or even to the covetous white man. Few white families could make a living on as much of this land as may support an entire Papago village. The very poverty of his land has been the Papago's guarantee, and his peaceful record is in large part due to the fact that he has had comparatively little provocation or interference. A high degree of adaptation through centuries of adjustment, combined with a low standard of living, have made it possible for over 5,000 Papago to live on about 5,000 square miles of this region, desertic both in climate and resources.

The Papago are the premier dry farmers, producing wheat on driest lands where it is known to be successfully grown, with as little as five inches of rainfall or less.[2a] Some years the crop fails entirely, for the rains do not always come. But yields as high as twenty-five bushels to the acre have been grown. A good harvest will furnish wheat enough to last several years, and the Papago have learned the wisdom of keeping a reserve on hand.

[1] The Arizona Republic, March 16, 1932, p. 1.

[2a] Carl Sauer and Donald Brand, Prehistoric Settlements of Sonora, with Special Reference to Cerros de Trincheras (University of California Publications in Geography, Vol. 5, No. 3, 1931), espc. p. 75.

11: Hoover U-4, 5 (ca. 1930) 1935

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Sand Papago

cate. Their vegetable food was largely the camote, an edible root found in the sand dunes, together with the beans of the mesquite and the fruit of the saguaro and pitahaya cacti, for which they came as far as Quitoboquito and the lower Sonoita River.[9] A few of them even now have temporary camps, as of old, south to the Gulf.[10]

Quitovac, the old head village for the Sonoita Valley, is Sand Papago in kinship. Descendant therefrom was the Papago village at Sonoita and the now extinct village of Tak and the nearly extinct village, Quitoboquito. Sonoita was an attractive and favored site, as the Sonoita River is here a permanent stream. The present village is composed mostly of Mexicans, numbering about 600, who crowded out the Papago. At present there are five Papago families with about sixty people at the lower end of the village.[11] Quitoboquito is a small oasis with one of the largest springs in the Papago country.[12] It never was but a small village,[13] and the population is now reduced to one half-breed family operating a cattle ranch. The spring is on the American side of the boundary line, but the fields and ranch are in Sonora.

Several small villages of Sand Papago are located around Ajo. They are a nomadic and very poor people, having small houses and a field here and there. The largest remnant of the Sand Papago is located at Dome and Blaisdell, about twenty miles east of Yuma. The population of the two villages totals about two hundred. They have fields along the Gila River and work as laborers on the Southern Pacific Railway.

FACTORS INFLUENCING SHIFTS OF PAPAGO VILLAGE SITES OR OF THEIR POPULATIONS

Several factors have contributed toward a disintegration of the older and larger villages. To begin with, a degree of concentration was a necessity for security, especially against Apache raids. As the Apache extended the range of their raiding activities over the Santa Cruz and Altar Valleys, the Papago abandoned all out-lying villages.

At this time the old village of Poso Verde, Sonora, was deserted and its people went to Comobabi, Sonora. The place became frequented by Apache bands. In 1874 the only evidences of habitation were the remains of a few bacquals and of an old adobe fort built by the Papago as a protection for their frontier village and grazing range. The "well" was described as a sort of pit or natural tank with a strong flavor of alkali, cow-manure, dead coyotes, and decayed vegetables.[14]

[9] Lumholtz, pp. 330–31.

[10] A list of the former camps of the Sand Papagos is given by Lumholtz, pp. 394–97.

[11] A Papago family may include married offspring living under the same roof.

[12] Kirk Bryan, pp. 164–65.

[13] Hornaday, p. 122.

11: Hoover U-4, 5 (ca. 1930) 1935
NU28 Papago NU28

ties and ranches is a good illustration. Grazing has enabled the non-tillable lands to be put to use, and many of the Indians prefer to live on or near their grazing lands.

Other factors responsible for the passing of the old order have been the digging of wells by the government which have scattered more widely the sources of dependable water, the development of mining communities, and increasing contact with the white population.[17]

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[17] There has been considerable variation in the names and spelling of names of Papago villages as given by various writers. Some revision is suggested of the names used on the government maps published in connection with Water Supply Paper 499. The Indian names are given preference in the present study, except where corruptions of them, or Spanish and American names, have become a matter of common usage. The U. S. Geographic Board has as yet taken no action concerning these names.

Special acknowledgment is due Father Bonaventura Oblasser, Superior of Franciscan Missions among Desert Papagos, for the invaluable assistance of his experience among the Papago.

13:Davis E-5 (1920) 1920 NU28 Papago NU28

[Encino p. 159]

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THE PERMANENT POND AT QUITOVAQUITA; WITH THE HOME OF MANUEL ORTEGA ON THE BANK AND THE LEGENDARY MOUNTAIN AT THE RIGHT

13:Davis E-5 (1920) 1920 NU28 Papago NU28

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grimage and ceremony may entail floods, drought, sickness, even death. To avoid these the people travel many miles, with teams or on horseback, under a blazing sun or in rainstorms, to participate in the ceremony. The place where the monster lived covers an area of two or three hundred acres of whitish earth or calcareous material, which the Indians claim to be the remains of the flesh of the monster. Below the surface are massses of immense bones. Quitovaquita is surrounded by tropical desert vegetation of palo verde, mesquite, palo fierro, giant or saguaro cactus, pitahaya or organ cactus, and other desert growth. It consists of twenty or thirty one-story houses, built of adobe or of stone imbedded in mud.

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In the center of the village is a *charco*, or large pool, which is fed by a number of springs and furnishes water for the village, and drinking and wading places for burros, horses, and cattle. When the pool is filled, the water is used to irrigate the gardens of the villages. During the period of the fiesta the village is thronged with visiting Indians, and those who cannot find accommoda-

13:Davis E-5 (1920)1920 NU28 Papago NU28

312 796 [124] tion in the houses, camp near the pool. The writer was fortunate in having the opportunity of visiting Quitovaquita during a fiesta, as the guest of Joseph Menager, who has a ranch near the border, and who speaks fluently both the Spanish and Papago languages.

796 We reached the village at 8 o'clock in the morning, and stopped at the house of the chief, whose Spanish name is Manuel Ortega. We went a half mile into the desert to the grounds where the ceremony was to be held, and met a number of the men who were to participate. Hanging on a small shelter were the ceremonial trappings that later were to be used during the fiesta. They consisted of deerskin masks that fitted over the head, the fronts of which were pierced by two holes for the eyes, and from the lower edges hung long fringes. Sashes of bright-colored fabric, necklaces composed mostly of blue-glass beads interspersed with short lengths of shell beads, bunches of eagle-feathers, robes, anklets girdled with cocoons filled with fine sand, and girdles of deerskin, suspended from

796 293 [532]

17:Castetter & Underhill N.E-5 (1931-1934) 1935
NU28 Papago NU28

Most hamlets make some effort to channel the flood water to their fields. Ditches are dug from the wash to the fields situated alongside, the ditch ending in the middle of the field so that the water will flow all over it. If there be several fields, one beyond the other, there may be a main ditch with several branches.

Planting in the old days was never begun until after the first rain ceremony had been held. This was not because it was taboo, but because the soil would be too dry. Any village which found it convenient held the first ceremony and "caused the rain." After that successive villages held ceremonies during the summer so that the rain would continue.

Nothing in the nature of plowing was done until after the coming of the Spanish missionaries. Since then until rather recently (when the steel plow was introduced), plowing has been done with a plow made from a single piece of mesquite wood *(Prosopis velutina)* (7). Before that the procedure was simply to wait until the ground was moist, then make holes with the digging stick and drop in the seed The digging stick was the same as that in the western Pueblo area and northern Mexico—a straight stick without a footrest, made of ironwood *(Olneya tesota)*, four feet long with a sharp point hardened in the fire. The man using it stood erect and dropped it into the soft earth where it made a hole four to six inches deep. A woman followed, carrying the seeds in a small basket; she pushed a little loose earth into the hole with her bare toes, dropped in four seeds, and covered them with a single foot movement.

In order to get the seeds in as soon as possible before it rained again, the whole hamlet generally worked together. If rain came the same day, the seeds would be washed out; if not for three or four days, they took root. They might be washed out several times in succession, in which case planting would be given up.

The principal work of the summer was keeping the ditches clean but cultivating was also done with the weed

17:Castetter & Underhill N.E-5 (1931-1934) 1935
NU28 Papago NU28

Tobacco was planted in March and the planter would choose a place at the mouth of a small wash, out of sight of all the other fields, for tobacco had to be grown in secret. As soon as the plants were up creosote bush branches *(Covillea glutinosa)* were stuck in the ground to shade them. No one but the planter must now visit the patch or the plants would become shy and sink into the earth again. If a menstruating woman were to see them they would shrivel up and die.

No hoeing or transplanting was done but merely earth heaped around the roots now and then. A fence of mesquite posts *(Prosopis veluntina)* with thorny cholla cactus *(Opuntia* sp.) between protected them from marauding animals, and a ditch dug from the wash to the patch conducted any possible rain water. The creosote bush shelter was left until the plants grew up and touched it. When the tobacco was ripe the leaves were pinched off and spread on a mat outside the house to dry, although they were considered ready for smoking when about half dried, still green and very bitter.

COTTON

Cotton, *to'ki* *(Gossypium* sp.)

The early Spanish accounts refer to cotton as being grown, not only by the Gila Pimas (10), but by the Sobaipuris on the San Pedro (27) and by the people of San Xavier (10) (who were not the present residents). Little mention is made of the growing of cotton by the desert people, but informants thought a little was grown in favored places. No particulars of its culture were obtained. Cottonseed flour made very good browned cakes when baked on hot sand.

WHEAT

Wheat, *pi:rkanyi* *(Triticum aestivum)*

Wheat seeds were given away profusely by Kino at the end of the seventeenth century. Most Papagos, however, say they did not take over its general use until two or three

18: Kelly NU28 Papago NU28

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[For author's suggestions on expanding Papago irrigation agriculture, see category 116, pp. 90-93.]

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quickly grew up at such locations as Quijotoa (Covered Wells), Alamo, and San Antone (formerly Weldon, with a population said to have reached 11,000 at one time). One by one the mines were worked out or failed, and although the mining communities were rapidly deserted, the improvements to the water supply enabled Papagos to occupy the locations advantageously wherever elaborate well machinery was not needed. [312] [311]

After the Civil War, the combination of growing Papago herds and numerous ranches established by white settlers resulted in substantial increase in the stock grazed in the area now included in the Papago Reservation. Papago "depredations" in the 1890's caused some ranchers to abandon the area, their losses being alleged to have been $300,000 in stock and improvements. Lumholtz reported in 1909 that several Papago stock men had herds of about 200 cattle and 50 horses, in excellent condition, in the western slopes of the Baboquivari Range. Nevertheless, Indian cattlemen and farmers were not secure in their land and numerous large tracts were held by non-Indians. 175 233 [648] [422].

A complete history of the establishment of the three Papago reservations is provided by a Bureau of Indian Affairs report (1944): 175 657 13 [014]

> "The first reservation for the Papago Indians was established at San Xavier on July 1, 1874, and the second at Gila Bend on December 12, 1882.... An Executive Order of June 17, 1909, reduced the size of the Gila Bend Reservation.

134 On the main Papago Reservation, erosion is reported as follows:

Slight	193,534
Moderate	1,183,840
Severe	1,160,960
Critical	236,200
	2,774,534

The individual districts, arranged in descending order of magnitude, are reported in Table 2. It is apparent from these figures and from a 1948 map of erosion conditions on the reservation, that large relatively flat areas in Schuk Toak District (especially on the southwest side of Aguirre Wash), in Gu Achi and Sif Oidak Districts (along Santa Rosa Wash), and in Chukut Kuk District are critically eroded, together with smaller areas in Solis, Baboquivari, and Pisinimo. Severe erosion is present in nearly all parts of the reservation, and the moderate or slight erosion areas tend to be concentrated in the central, southeast, and extreme northwest parts of the reservation.

[185] [312] Both in order to increase grass for forage and to control erosion, extensive areas have been provided with earth dams and with spreader dikes designed to distribute water more evenly and reduce the rapid and damaging runoff [311] from summer storms. Nevertheless, erosion continues to be a serious problem and its effects limit both carrying capacity for stock and possibilities for flood water farming.

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Table 2. Soil Erosion Conditions on the Papago Reservation, In Acres (Based on Data in Files of Branch Of Land Operations, Papago Indian Agency, Sells)

	Slight	Moderate	Severe	Critical	Total
Schuk Toak	13,774	97,920	252,160	92,800	456,654
Sif Oidak	44,800	189,440	178,880	22,628	425,748
Hiokiwan	38,400	171,520	68,723	5,142	373,782
Gu Achi	4,860	119,680	157,440	11,025	293,025
Chukut Kuk	24,960	103,040	103,520	48,765	284,285
Pisinimo	16,640	126,720	127,560	10,960	281,680
Gu Vo	29,440	110,074	90,240	2,560	232,314
Sells	4,480	127,846	58,240	24,960	215,258
Baboquivari	16,180	136,960	38,400	19,360	210,882

Note: The Soil Erosion Service categorizes these conditions thus:

Slight: No apparent acceleration of normal geological erosion.

Moderate: Less than 5 inches of topsoil removed.

Severe: From 5 to 9 inches of topsoil removed.

Critical: More than 9 inches of topsoil removed.

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Availability of Water. As is true of all of Arizona south of the Gila River, water for the Papago Reservations must come from deep wells. Water from this source, in proven or probably quantity (more than 200 gallons per minute), occurs in three broad valleys, evenly spaced from east to west across the main reservation and in four localities along the northern, southern, and eastern borders (see map 3).

●312 map 3). In addition, water in quantity has been found in
133 the limestone rocks in the northeastern corner of the reservation and in the volcanic rocks that cover the western section (Heindl and others, 1961). Ground water at an economical depth also occurs on both the San Xavier and Gila Bend reservations.

It would appear from the Heindl report that ample water is available for residential, industrial, and stock water purposes in all sections of the reservations except in the mountainous areas. The community of Sells, for example, had a local supply of ground water which yielded approximately 250 gallons per minute. When additional water was required for the operation of the new Sells hospital, two wells, yielding about 450 gpm, were developed five miles to the west. When additional supplies are needed in the future, proven water bearing ground can be tapped in a wide
[361] valley area three miles beyond the hospital wells. Communities located in the valleys, of course, would have ample local supplies. Such locations are Chuichu, Santa Rosa, Gu Oidak (Big Fields), Vamori, and San Miguel.

Water for irrigated farming on the reservation is limited by the lack of ground water at a depth which permits pumping at a sufficiently low cost for agricultural purposes. Water at depths less than two hundred feet is found only near Chuichu, in the Tat Momoli Valley to the south, and in the Santa Rosa Valley to the southwest. Water

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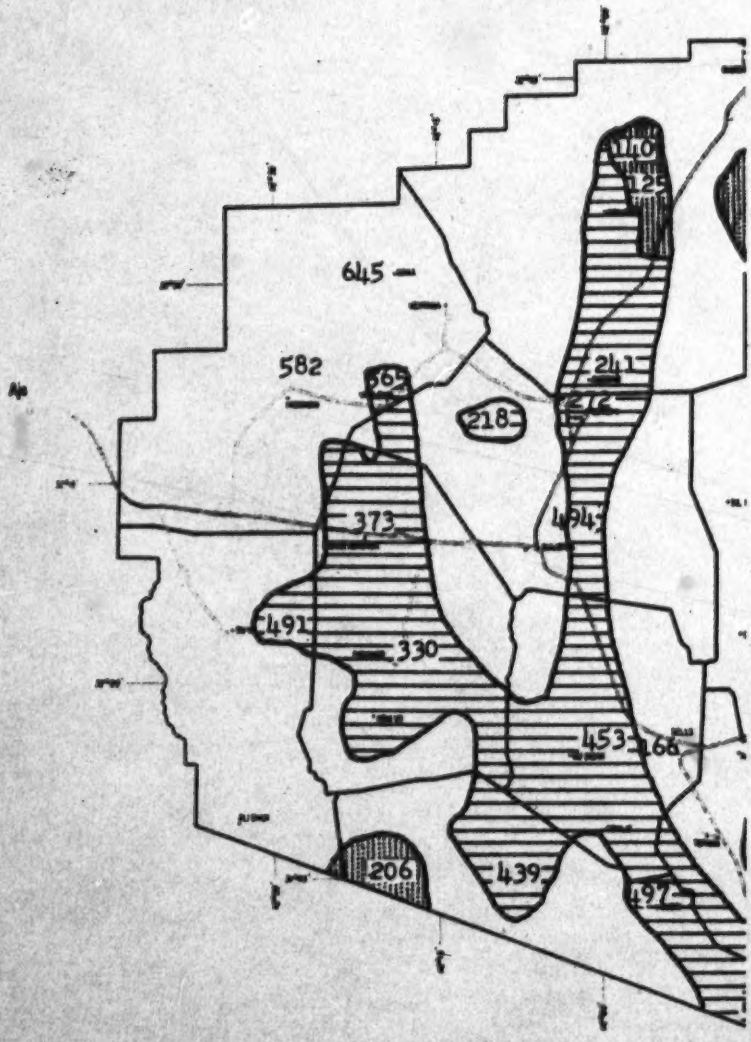

[p. 28-A]

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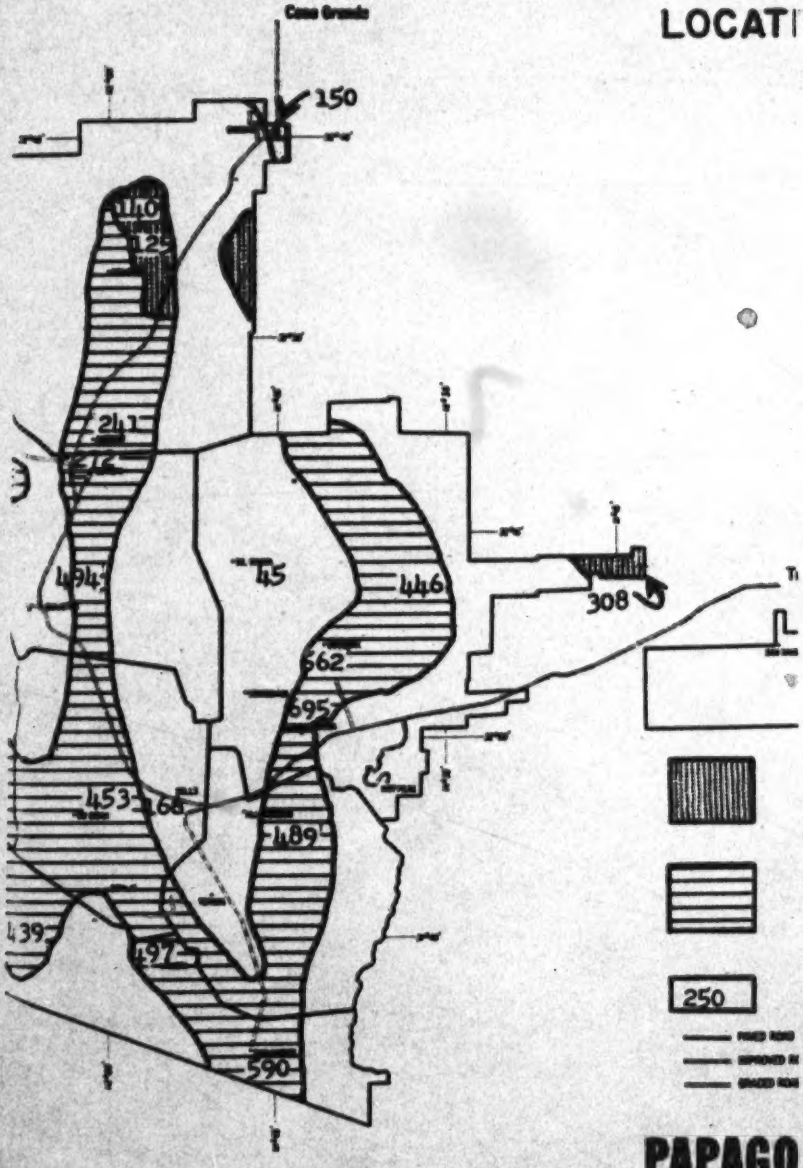

[p. 28-A2]

18: Kelly E-4, 5 (no date) 1963 NU28 Papago NU28

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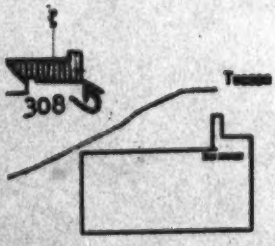
MAP 3
LOCATION OF GROUND WATER
(From Heindl and Others)



Areas where Ground Water Used, or Is Considered Sufficient for Irrigation.

Areas where Ground Water at 200 Gallons per Minute, or More, May Be Encountered at Depths of 100 to 600 Feet.

250 Depth to Water in Feet from Land Surface for Selected Proven Sites

PAPAGO INDIAN RESERVATION

1963

[P. 28-A3]

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at 150 feet with a 100 foot draw-down is available at Papago Farms in the southwestern corner of the reservation. Water elsewhere is found at from 200 to 600 feet. Heindl reports on irrigation possibilities as follows (Heindl, p. 19):

> "Ground water is used, or is considered to be sufficient, for irrigation in five areas on the reservation. These are: (1) east of Chuichu, where about 1,200 acres are being irrigated; (2) the Santa Rosa Valley northeast of Kohatk, where pumping tests indicated potential yields of 1,000 gpm with draw-downs of about 50 feet; (3) the west-central part of Tat Momoli Valley along the reservation boundary, southeast of which commercial irrigation is now practiced; (4) the east end of the panhandle in T.14 S., R. 11 E., which is in Avra Valley, an extensively irrigated basin; and (5) the Molenitus Valley in the southwestern part of the reservation, where quantities of water adequate for irrigation recently have been proved.
>
> "Information gained from examination of well cuttings and from bailing tests suggests that two other areas probably have sufficient ground water for irrigation development, but more adequate testing is needed for proof. These are Window Valley (west of Gu Achi) and the south central part of Gu Ciḍuk Valley (west of Sells). The rest of the areas that are outlined as part of the deep alluvial aquifers probably would yield water in sufficient quantity for irrigation development also. The alluvium in these areas is tapped only by wells of small yield equipped with windmills, but, because of the topographic setting and the fact that the alluvium is thick, potential yields of wells may be much greater. Thorough testing of the alluvium, however, should precede its development to pump irrigation."

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Water from wells on the reservation generally meets the chemical-quality limits suggested for domestic and public supply used by the U. S. Public Health Service

312 except in the southwest quarter of the reservation and other small areas where the fluoride content is greater than 1.5 parts per million, the maximum suggested for domestic use (Heindl, p. 22).

175 312 Reservation Water Development. Prior to the systematic and extensive drilling of deep wells in the Papagueria, the Indians depended, during the long winter and spring period, upon a few widely scattered tanks and springs, which tapped small portions of the ground water supply. I some instances, shallow wells were dug to supplement natural water sources near the winter villages. During the summer and fall, at least, man-made catch basins (charcos) could be depended upon to hold a supply of water originating from run off from the heavy summer thunderstorms.

The brief and intensive period of mining activity in the late 19th Century was marked by the first large-scale use of ground water. Numerous relatively deep wells were dug or drilled, some of them continuing to supply Papago villages after the mining ventures came to an end. Nevertheless, wells remained few, more important for limited domestic use than to support the large numbers of cattle and horses grazed on the Reservation.

175 312 659 311 The first large-scale program of water development by the Bureau of Indian Affairs was in the middle 1930's. At that time 56 wells, 18 dams, 41 masonry storage

tanks, and 76 earth-walled tanks (charcos) were built. Water thus supplied not only permitted the year-round use of the range but permitted cattlemen to place their cattle in areas formerly not usable because of lack of water. Nevertheless, it was reported as late as 1949 that "only 40% of the Papago range is now within reach of permanent stockwater" (The Papago Development Program, 1949, p. 30). This situation, of course, tended to accentuate the over-grazing of areas with a better water supply.

From 1953 until the termination of the program in 1958, the Papago Development Program expended $1,041,181 on stockwater development, including not only wells, but windmills, power pumps, dams, storage tanks, and similar construction. During this same time deep wells were drilled to supply water for the Chuichu farm development.

Since 1958, with the completion of the well drilling program, emphasis has been upon range development and soil and moisture conservation. During the past five years, to June 30, 1963, about $500,000 has been expended for these purposes, mostly in the construction of detention dams.

At the present time there are 23 irrigation wells operating on the main reservation and at San Xavier. In addition there are 160 wells for domestic and stock water use, on the main Papago Reservation, six at San Xavier and two at Gila Bend.

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657 During 1960 the Public Health Service initiated a program to provide domestic water and improved sanitation facilities in Papago villages where local arrangements could be worked out, and where water could be supplied from existing wells or developed at reasonable cost.

Under this program, local Indians provide necessary labor for the installation, purchase purely personal items of equipment, and establish a system for local maintenance of the water lines and tanks. The Public Health Service provides the equipment and pipe for a water distribution system, including a water line to each home.

The current program will continue until all villages that meet the necessary requirements have been supplied with water distribution systems and sanitary facilities.

At the end of June, 1963, the following village water projects had been completed: Quijotoa, Kaka, Hotason Vo, Havana Nakya, Sil Nakya, and Schuchuli. In the case of the latter two only well improvement was programmed. Work is in progress in the following villages: Topawa, Pisinimo, Ali Chuk, Gu Vo, and Viopuli, and work is expected to start in the near future in Santa Rosa, Cowlic, Anegam, and Gu Komelik.

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491 Public Utilities and Transportation. Good roads, power lines, and telephones are usually found side by side on the reservation, reaching, of course, the principal centers of population. Roughly speaking, this involves the arc

175 233 small. Most cattle in the 18th and early 19th Centuries were probably semi-wild and formed only a minor part of the subsistence base of the Papago.

175 233 563 Soon after the Gadsden Purchase of 1853 non-Indian ranchers began moving into the area of the main reservation, most of which, until 1917, was public domain. There are no accurate figures on the extent of non-Indian ranching during the years prior to 1917. Large ranches, however, were established in various areas of what is now the main reservation and these were later acquired by the federal government for the benefit of the Papago.

175 233 ● 312 361 Cattle ranching by Indians was on a small scale prior to the drilling of the first wells for stock water in the early 1900's. There thus was added to the traditional Papago well settlement (near an assured supply of water for the winter season) and the field settlement (near the floodwater fields used in the summer) a third recognizable type of settlement, the ranch. A. F. Mark has tabulated the number of identifiable Indian ranch locations between 1850 and 1960 (Mark, 1960, Tables 4 and 5). In 1900 there were six such locations. Another 14 were established by 1925, and another 12 by 1960. Because some were abandoned through the years, there were a total of 23 Papago ranch and grazing locations in 1960.

175 233 These data support the inference that livestock raising began to have substantial economic significance for

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Table 12. Cattle and Horses Grazed on the Papago Reservations, 1949 and 1959 as Reported by the Bureau of Indian Affairs

Reservation and Year	Acres in Range	Total Animal Units	Acres Per Animal Unit
Sells			
1949	2,761,471	21,626	127
1959	2,755,686	17,487	158
San Xavier			
1949	69,232	899	77
1959	69,232	682	101
Gila Bend			
1949	10,172	235	43
1959	10,195	70	145
Totals			
1949	2,840,875	22,760	125
1959	2,835,113	18,239	155

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[422]
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The present distribution of cattle and horses on the reservation shows that livestock ownership is spread much more evenly over the reservation than formerly. A probable explanation for this modified distribution is the far larger number of wells now available, permitting the running of cattle in areas formerly unusable. This is a more advantageous use of the reservation resources, of course, since it permits less intensive grazing of each location and less damage to grass cover. A comparison of the grazing units calculated from Cletts' 1914 data (Table 11)[1] with current figures (Table 12) shows the nature of the change in cattle distribution. There are now increased numbers of

[1] [See P. 72--Analyst]

175 planted by Indians ranging from 800 to 1,200. By 1916, with
241 water no longer available from the Santa Cruz River, 1,320
311 acres were irrigated with water from three wells. Indian
[312] farming continued at about this scale until 1953 when the present abandonment of farming by Indians at San Xavier commenced. In 1956, as shown in Table 14, a total of 886
[427] acres lay idle. The answer was a program for leasing San Xavier farm land to non-Indians which commenced in 1957.

241 During 1962 a total of 12 San Xavier Indians were
463 engaged in farming, but mostly in small garden plots. The smallest of these was one half acre in size.

175 Indian farming at Chuichu has had a somewhat
241 different history. Although known to have taken place,
311 pre-Spanish farming in this area has not been specifically
312 reported. The first report on the area is from Clotts (1915), who reported that 188 acres were being irrigated from the Santa Cruz River, but that the building of a canal to Green's Reservoir up stream had cut off a part of the water to Papago fields. Commencing in 1931, deep wells were drilled to supplement and replace the river water and, by 1937, 615 acres were developed for irrigation. In 1955, through the leveling of additional land and the drilling of new wells in an area just east of Chuichu, the Bureau of Indian Affairs made a total of 1,612 acres available to Indians. See Table 14.

The rapidity with which the level of ground water in the Casa Grande Valley is being lowered now threatens the life of the entire Chuichu project. During 1962 the one remaining productive well on the west side was choked with silt during an early fall flood on the Santa Cruz, reducing its capacity from 750 to 250 gallons per minute. Since this well had already been drilled to bedrock at 230 feet, and the water level had sunk to within 20 feet of this point, it was decided not to redrill the well. The result will be the abandonment of all farming on the west side and the transfer of Indian holdings (a farming cooperative) to idle land on the east. 241 133 312 311

Even the eastern section, developed after 1955, is threatened with the lowering of the water table at a rate that may cause its abandonment during the next decade.

During 1962 five Indian farmers were growing crops in the eastern section. In addition, the East Chuichu Project (an Indian cooperative) farmed an area of 80 acres of which 40 were planted in cotton. During 1963 the 65-acre cotton allotment on the western side was moved to the eastern section and management of the new land turned over to a non-Indian operator. 248 311 [474]

Development of irrigated agriculture at Gila Bend and at Papago Farms has always depended upon leases to 241 311 429

WHO--this report is about--Papago Indians

This report is concerned specifically with the role in the southern Arizona cotton harvest of over 7,000 Papago Indians who live along the Mexican border. These natives speak a Piman language closely related to others spoken from the Gila River south to the border of Sinaloa in Mexico. They call themselves the Tohono Au'autam, The Desert People.

A few hundred Desert People live on the Mexican side of the border. Some inhabit Indian rancherias--villages with houses scattered barely within sight of each other--close to the frontier, and have contacts with American Papagos. Others eke out a parasitic existence around towns of Mexicans who have taken their lands. They are said to have given up their Indian heritage and are waiting passively to die.

The thousands of Desert People in the U. S. are a people with hope and pride in being Indian. A few hundred make a living in low paid jobs in Anglo cities. They have chosen to break away from their Indian heritage in an endeavor to give their children a head start as citizens of wider Anglo-American society, especially by affording them a formal education in public schools.

Most of the Desert People, however, live in rural semi-desert areas reserved for them by the U. S. from their former territories. The San Xavier community was reserved some of its lands in 1874 by Presidential Executive Order. This 71,090 acre reserve slices through the Santa Cruz River bottoms, and could once be irrigated with surface flow (until Anglos started erosion that cut the channel--and the water table--20 feet below surface) and now is irrigated from wells. Most of it was allotted to individuals, and the useable agricultural and range land is now mostly in heirship status. That is to say its use is amazingly and cripplingly complicated by the fractionalization of holdings through inheritance. Fortunately, the San Xavier community continues to recognize old use-rights more than the legal allotment system.

131 A few Desert People live on a tiny 10,235 acre
657 reserve at Gila Bend set aside in 1912 by Executive
312 Order--leaving the village outside the reserved
[311] area! Some of this land could once be irrigated by surface flow from the Gila River which is now impounded far upstream, and none is farmed now.

A few Papagos live on the Maricopa Indian Reservation upstream under the Pima Indian Agency on lands partially irrigated by pumps tapping the underground flow.

The greatest number of the Desert People live on the 2,773,896 acre Papago Indian Reservation running north from the Mexican border within a few miles of the Southern Pacific Railroad. Only a few hundred acres at the northern tip of the reserve projecting into the Gila River valley can be irri-
[133] gated by pumped water. There is no running surface stream in the entire area. An irrigation of sorts
[433] using flood waters from late summer rains has been practiced for unknown centuries by the Desert People to raise subsistence crops to supplement the surprising variety of foods gathered from the desert plants or hunted. Water under this reserve is too deep and too scarce for economic irrigation.
[185] "To many Papago a good field, enough cattle to provide occasional meat and money, a few horses for prestige, and plenty of rain would make the ideal combination."[1]

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[1]Joseph, Spicer & Chesky, 1949, p. 59.

361 Drainage (a) is no problem in southern Arizona be-
362 cause of the lack of rainfall. Even after a summer
[312] cloudburst the ground dries out for all practical pur-
[23] poses in a day. And the domestic water of the region comes from undergrcund, so there is no question of locating camps on a watershed. In this study no large animals were found in any of the labor camps visited, except for a couple where Papago horse owners had brought mounts to camp, and kept them out in the fields on pasture.

Overcrowding camp sites (b) is another matter. It is difficult to define overcrowding in view of the small number of activities carried on in labor camps during picking season. But a number of southern Arizona camps are sandwiched between a road in front and a field fence behind, without space to drive a car between the rows of cabins. The average distance between dwelling units in Pima and Pinal county labor camps[1] is some 25 to 30 feet. In camps built of concrete blocks, the units are usually arranged in a straight line as apartments without space between. Often tents are spaced with only a yard between. Some spacious camps, on the other hand, leave 60 or 75 feet between units. Always a family's neighbors are very much present in Pima and Pinal county labor camps, however. Quarrels, and indeed most of the ordinary events of living, are quite audible next door. Privacy is difficult to achieve.

13 Since the valleys where cotton is grown in this re-
361 gion are already quite level, grading (c) isn't necessary. In fact, it would only aggravate the dust problem, which is acute. For the sandy soils of Pima and Pinal counties cannot support much vegetation on the scanty rainfall. The open soil blows readily. Heavy winds in the cotton growing areas stop traffic on main highways regularly each year while the plants are small and cannot hold the soil--the dust load in the air becomes simply too thick to see through.

362 Labor camps are located beside roads for ease of ac-
[361] cess. Except for a few along main highways which are
[363] paved, camps are covered with a thick dust coat every time a vehicle drives by, throwing up a high cloud of dirt behind. In dry, dusty air harvesters work, eat and sleep.

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[1] 30 feet in 14 Pima county camps, and 25 in 22 Pinal county camps visited in this study (estimated distances.)

362 At dusk when breezes are still and hundreds of
361 trucks and cars have returned from the fields to labor camps, stirring up dirt roads, a choking dust pall rises all over the cotton growing valleys. The picker gets his last view of the distant mountains each night through this low hanging dust cloud.

[312] Probably because of the permanent water shortage in both counties, none of the cotton farmers has seen fit to plant cover crops on his labor camp grounds. Nor have any farmers been concerned enough over dust problems to oil either section line roads or camp grounds.

SOCIAL CONTROLS IN LABOR CAMPS

466 Apparently the main desire of many cotton farmers
361 is to have as little to do with their labor camps as
364 possible. This is reflected in the generally messy appearance of the uncared-for grounds in unsupervised camps. It is a rare camp without cotton or tin cans or paper or garbage or all four scattered about.

186 However, lack of supervision is not the only reason
361 southern Arizona labor camp grounds are generally messy
364 looking and not very hygienic. One primary reason for dirty camps is their very nature. Their population is temporary and transient, without any sentimental ties to or pride in the camps. As a result, laborers simply do not care about the appearance of camps, and do not bother to keep them clean. It is interesting to note the exceptional labor camps in the region where workers are employed on a year-round basis, and have time to form some attachment to the camp. Even if these year-round workers must live in tents, they make some attempt to beautify the camp grounds. They try to grow a patch of lawn, or a few straggling castor bean plants, or a rose or some iris--and they keep the grounds around their dwellings neat and clean. An urge to grow something seems especially strong among the Desert People and the Mexican-Americans.

621 Besides this factor of length of residence in labor
361 camps, there is another aspect of social organization in-
364 volved in so many camps being dirty--with operators having a difficult time coercing residents into cleaning them up. This is the fact there is no real social organization extending through the whole camp. The laborers are a miscellaneous lot generally hired as they come

[Arizona Labor Camps]

364 [415] burning it there. Perhaps two-fifths of the camps in the county were provided with 50 gallon metal drums for refuse, but like those in Pima county, they lacked covers, and sat on the ground instead of a stand. Collections were just as irregular as in the smaller cotton growing area. Garbage collection was a sanitary joke in many Pinal county labor camps, for about three-fifths of the farmers providing garbage cans carried them no farther than across the road or somewhere on the camp grounds to dump them. This practice made many fine homes for wandering flies in the hot fall months of 1950.

One farmer hiring Papago irrigators derived some benefit from his workers' scraps--and probably kept as clean a camp as any--by keeping a large flock of geese which roamed freely through his camp cleaning up the grounds.[1]

WATER SUPPLY

● 312 The water workers drink has a very important effect on their health, and for labor camps the suggested code calls for less water than each laborer should have in southern Arizona with its extremely high temperatures and abnormally dusty conditions. So the suggested code may be considered lenient for southern Arizona conditions.

"Article 3. Water Supply

"(a) An adequate and convenient supply of water of quality approved by the State board of health shall be provided in each camp for drinking, culinary, bathing and laundry purposes.

"(b) A water supply shall be deemed adequate if and when it is capable of delivering 35 gallons per person per day to the camp site at a rate two and one-half times the average hourly demand.

"(c) The distribution lines shall be capable of supplying water at normal operating pressures to all fixtures for simultaneous operation and water outlets shall be distributed throughout the camp in such a manner that no shelter is more than 100 feet from a yard hydrant or similar outlet.

[1]Statements on garbage disposal are based on information gathered on 14 Pima county and 18 Pinal county camps.

[Arizona Labor Camps]

●312 "(d) In those areas where piped distribution of water is impracticable...Every well shall be tightly covered, and the water shall be obtained therefrom by means of some type of pump. Water shall not be drawn from any well by means of buckets or other containers. In the event it is necessary to haul water, the containers both in transit and at the labor camp shall be cleaned and sterilized frequently, and shall be kept tightly covered. If water is secured from tanks or containers a spigot for withdrawal therefrom shall be provided, and it shall be unlawful to dip water therefrom.

"(e) The type of drinking facilities shall be approved by the State board of health."[1]

[291] All the water drunk in southern Arizona camps comes from wells, since surface water is scarcely sufficient to supply the area's population, and too distant from the population centers to make transporting it feasible.

In Pima county about 70% of the labor camps are supplied water directly from storage tanks on wells at the site or at the nearby home of the cotton growers.[2] [415] However, in a fifth of these camps workers had to carry their water from a tap at the storage tank to their cabins in buckets, and store it in their cabins in whatever containers they might have. Except for one camp visited provided with inside plumbing, the rest were serviced by hydrants outside the cabins. The number of hydrants supplying water piped from a storage tank varied from 1 for 3 worker's cabins to 1 for 14 cabins, averaging 1 outside hydrant for each 5 cabins.[3]

Nearly a third of Pima county labor camps lacked water delivered directly from a well in 1950. They were about equally divided between camps equipped with cisterns filled from tanks hauled from the farmer's well and camps where a tank-trailer of water was parked. Pickers drew water from cisterns with hand-pumps,[4] with an averaged of a single pump for each 16 cabins.

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[1] Federal Interagency Committee on Migrant Labor, 1947, p. 40-41.

[2] Of 14 camps on which data was obtained, 10 received water from storage tanks at a well--71%.

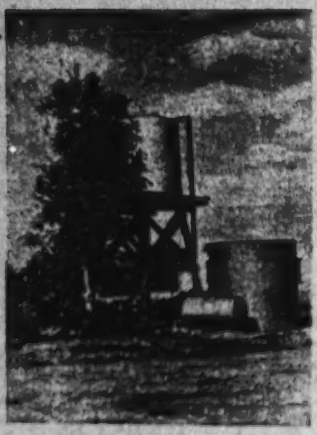
[3] Actually 4.89 cabins, judging from data from 8 camps.

[4] 47 cabins had 3 pumps, averaging 15.66 in 2 camps studied.

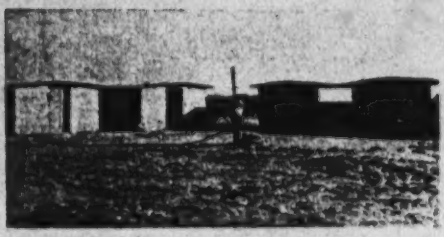
[Arizona Labor Camps]

Water

312



Pumped from a well and stored in a good tight tank . . .



delivered from 1 faucet for 9 cabins which looked like they'd been sawed from the same tree . . .

312
415

or two 50-gallon drums for 5 families . . . which is ridiculous . . .

but kept in an assortment of containers at each cabin.

[Arizona Labor Camps]

312 Only laborers living in very small labor camps had to skimp on water from trailer-tanks. There was a tank for every 5 cabins, in these camps, although tanks were sometimes ridiculously--and dangerously--small. Farmers haulingwater to their labor camps in this area probably have never even thought of sterilizing their equipment.

In Pinal county a higher proportion of the camps received water directly from wells. Over 90% of them have been built near a well.[1] Nearly all of these wells, about 9 out of 10, supplied water for pipelines to faucets by the cabins. However, the number of persons using each hydrant in 1950 was apparently double that in Pima county. Hydrants outside the cabins were provided at a ratio of 1 to 7½ cabins to 1 per 14 cabins, with the average 1 for each 11 cabins.[2]

CLEANLINESS

515 [466] If cleanliness is next to Godliness, the Desert People living in southern Arizona labor camps are amazingly close to their Diety. But it is their own doing, and not that of the farmers operating labor camps. For the cotton growers had made almost no provision for laundering or bathing in their camps in 1950. If pickers were to be clean, they had to struggle against terrific odds of dust, sweat, scrub-boards, and wash pans. What labor camp operators should provide in the way of such facilities is set forth in the suggested labor code we are referring to:

"Article 7. Laundry, Handwashing, and Bathing Facilities.

"(a) Laundry, handwashing, and bathing facilities shall be provided in the following ratio:

1.wash basin for every 6 persons.
1 shower head for every 10 persons.
1 laundry tray or tub for every 40 persons.
1 slop sink in each building.

"(b) All bath rooms or utility buildings shall be well lighted and ventilated. Floors and ceilings shall be of smooth finish but not slippery materials and impervious to moisture, and sloped to drain...

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[1] Based on 13 camps on which data was obtained; 12 had wells.

[2] Based on 7 camps averaging 1 hydrant per 10.9 cabins.

3: Whited G-5 (1890) 1894 NT15 River Yumans
Papago NU28
Pima NU29

Pa 658 797

There is what is termed a "contract school" located at Tucson, which many of the Papago children attend. The school is established and supported in part by a missionary department of the Presbyterian church. The buildings are large, airy, well planned, and adapted to the purpose required. The pupils seem well disciplined and clean. The government pays a stated sum annually to the school for each pupil in attendance as reimbursement for board and clothing furnished. The school owns 5 or 6 good buildings, all in good condition and well furnished, also a farm of 43 acres. On account of lack of water but few garden vegetables are grown, but barley and wheat yield abundantly.

Some of the scholars are taught carpentering, painting, and plastering, and their work is quite satisfactory.

PAPAGOS LIVING OFF THE RESERVATION.

Pa 131 197

These Papago Indians live in the southern part of Pima county, along the southern border of the territory of Arizona. Their language is similar to that spoken by the Pimas. They roam over a country about 100 miles in width north and south and about 125 miles east and west, and there are a few small villages over the Mexican border but near the boundary line.

Pa 13 231

The country in which they live consists of broad, open plains, divided by mountain ranges. The valleys or plains are arid, having no natural springs or running streams of water; yet after the summer rains these plains are covered with grass of a fine quality, and owing to the dryness of the air this grass is cured or dried on the ground and furnishes good, rich food for cattle during the remainder of the year.

Pa 361 312 342 [231] Pa [352]

The Indians select their dwelling places at the foot of the mountains near the mouth of the various canyons that open out into the plains. Small springs often flow through these canyons and sink into the sand. The Indians utilize these springs or sink wells into the sand, and thus secure the underflow from the springs. Their cattle feed out into the plains and return to these wells or springs to drink. Near these watering places, usually on an elevation, the Indians build their houses in their permanent villages of adobe, about 12 by 16 feet in area and about 8 feet in height. Small poles are laid on top and crosswise of the building, and on these are laid brush, with weeds or grass on the brush, the whole covered with about 6 inches of clay, which is impervious to water. The floor is of clay, and there is one doorway, but no windows. The doorway is sometimes closed with a dried beef hide. As a rule, they live on the outside of the house. The house contains no furniture except a little bedding and some cooking utensils.

Pa 262 439 291

Their food consists of beef, dried wild fruit, dried mesquite beans made into a kind of bread, and wild game. During the summer rains they raise some vegetables, which they dry for winter use. They also sell or trade cattle to settlers in the Gila and Santa Cruz valleys for wheat and corn, which the women grind in their crude way into meal and flour. They have adopted the civilized mode of dress, and are gradually learning the use of soap.

The women of the tribe are virtuous and industrious, being in these traits far in advance of any other tribe in the territory.

Pa 161 648 Pa 46

There are 4,000 of this tribe living off the Papago reservation. With rare exceptions they are self-sustaining, have always been good citizens, and on many occasions have joined with the whites to assist in suppressing murderous Apaches. The principal occupation of the men is raising cattle and horses, and a little farming when they can find a piece of damp ground that will raise corn and vegetables, hunting, chopping wood around mining camps, and ordinary labor wherever they can find it. If there is any mixed blood in the tribe it is not perceptible.

There are several mining camps scattered throughout the country which these Indians inhabit, and in some of the large valleys wealthy men or companies have sunk wells 500 or 1,000 feet deep and established cattle ranches or ranges, and many Indians are employed about these camps and mines.

Pa 133 497 234

The country is somewhat difficult of access, as there are several mountain ranges running through it. The roads follow the valleys, and sometimes it is "a long way around where it is only a short way across". These mountain ranges abound in game, which the Indians hunt.

Pa 279 231

A month's travel in these Papago villages failed to reveal a single case of drunkenness, although there are frequent instances of drunkenness among Indians in the streets of Tucson. They have great numbers of horses and cattle, but it is impossible to form a correct estimate as to numbers. The horses are small and inferior, but the cattle are fully up to the average in size and quality.

Pa 648 771 797

These Indians as a tribe have always been exceptionally friendly to the white people. They have never received aid from the government. The little religion they have is a conglomerate of Roman catholicism, superstition, and Indian hoodooism. The Roman Catholic church established missions among them more than 150 years ago.

THE RESERVATION AND NONRESERVATION PAPAGO INDIANS, PIMA AGENCY.

Report of Special Agent C. W. Wood on the reservation and nonreservation Papagos of Pima and Cochise counties.

Pa 101 Pi [101] Pa [797]

TRIBAL NAME.—The Papagos and Pimas were formerly one tribe. Authorities differ as to the derivation and meaning of the name. One view is that Papago means "hair cut", another that it means "baptised". Neither of these meanings has any etymological basis or value. The most reasonable derivation of the term seems to be the following, derived from conversation with the oldest Indians: the division of the Pimas occurred from the labors

3: Whited G-5 (1890) 1894 NT15 River Yumans
Papago NU 28

101 of the jesuit missionaries. When a considerable number of them had accepted the teachings of the missionaries
797 they were called, by way of distinction, Papagos, from the Spanish word for pope, "papa". Baptism was involved in their becoming christians, and hair cutting was an incidental result of the influence of the missionaries. Neither of these facts, however, can account for the name. On the other hand, the derivation from "papa" is etymological and consistent with the facts. They had become adherent to the pope. So far as I can learn, this explanation of and origin of the name has never been published.

The resident missionary at Sacaton gave still another derivation of the word Papago. He speaks and preaches in the Indian tongue, and thinks the name is derived from the word "pa-pa-cot", meaning discontented. This could easily be corrupted into Papago. The Indians at an early date became much dissatisfied with the practices and tyranny of the jesuits, and this term was naturally applied to them.

166 The Papagos are a semi-nomadic tribe, their migrations being due to the peculiar character of the country which they inhabit. The exigencies of food, water, and labor are the principal causes of their temporary changes of habitation; but the extent of their migrations, and the localities which they occupy for varying periods, are within certain limitations. When, through the presence of wells or running water, the supply of that indispensable element is unfailing, they migrate in search of food or labor.

●[312] When the water supply, which is procured from natural water holes or the earth reservoirs constructed by them, called tanks, where it accumulates during the rainy season, has been consumed, they remove to the vicinity of wells or running water found in the canyons of the mountains or in the deep valleys among the foothills. This migratory feature of their life greatly enhances the difficulty of an exact enumeration of the tribe.

[131] The territory over which they range lies south of the Southern Pacific railroad, in Arizona, and is about 100 by 150 miles in extent. Many thousands are also located in the state of Sonora, Mexico. They move back and forth at will between the two countries, and when a village is found in motion inquiry alone can determine, and then not always with certainty, on which side of the line they really belong.

161 From various publications relating to Arizona, and from the statements of ranchmen, miners, traders, surveyors, and a census enumerator, quite conflicting and divergent estimates were obtained of the number of the Papagos. These estimates range from 3,000 to 7,000, while most of them agree on 5,000 or 6,000 as the real number. One difficulty to be experienced in their enumeration is that at any season of the year a village of permanent houses, evidently the abode of hundreds of Indians, may be found without a single inhabitant, not because it has been deserted, but because the inhabitants are gone temporarily, leaving no information as to where they have gone, for what purpose, or for how long a time, and it would be impracticable to wait until their return or to follow them.

The only available method for obtaining even an approximate estimate of the number of these Indians seemed to be to ascertain, as far as practicable, the number of their villages and the aggregate number of houses contained in them. Multiplying the total number of houses by the average number of inmates per house would give a reasonable result. By actually counting the inmates of many houses in several villages, and with the indorsement of the judgment of the enumerator, 5 was adopted as the average number of inmates per house. As not less than 4 nor more than 11 were found in any given case, it was decided that 5 would be a conservative average and insure a total within the actual number rather than in excess of it.

126 In the accompanying map, showing the route during a 10 days' trip through the Papago country, Pima county is
161 given on a scale of 7.5 inches to the mile. The villages are located from actual visitation or on information, with no effort at mathematical accuracy, but with the design of suggesting relations and distances. The trip was planned so as to reach as many villages as possible during the time allowed and to make a fair and correct census. The villages given in red are those actually visited, 5 of which were located by the Indians. The 2 villages marked with black, situated near the large ranch, were located, but omitted by mistake. The accompanying figures indicate the number of houses in each village. The villages given in black were located through the courtesy of
[115] a trader among the Papagos, who is generally conceded to be the best informed person in Arizona in everything which relates to the tribe. The figures in black indicate his estimate of the population of each village. His estimate of the numbers living in the villages actually visited in enumerating varied only about 25, more or less, from the numbers in the given villages obtained by the multiplication of the number of houses by 5. In the cases mentioned the population was from 250 to 300, and such close agreement gave additional credibility to both his and our estimate.

161 The number of resident Indians at San Xavier was ascertained exactly when the reservation was divided among them in severalty, and is perfectly reliable.

Papagos at San Xavier	363
Papagos on line of expedition:	
467 houses, multiplied by 5	2,335
Additional, estimated by I. D. Smith	2,443
	5,042
Additional, reported by C. W. Crouse, agent at Sacaton (Papagos on the old reservation at Gila Bend).	40
Resident at Sacaton reservation	60
Total	5,139

3: Whited G-5 (1890) 1894 NT15 River Yumans
Papago NU28

133 134 PHYSICAL CHARACTERISTICS OF THE REGION.—The territory covered by the Papagos in their migrations, and in which their villages are located, consists of mountain ranges and the intervening valleys. The soil of the valleys contains a considerable proportion of clay, so that it is all called adobe soil. In the mesas or plains occasional strips of sand occur. Along the arroyos, or dry water channels, deposits of gravel are numerous. The arroyos become raging torrents during the rainy season, rendering travel impossible or dangerous during the temporary flood. The soil of the foothills is very rocky. Alkali is present in the soil in varying proportions, giving the characteristic name to the vast stretch of country known as the alkali desert. It is not the presence of alkali, however, that makes the desert, but the absence of water. An abundant water supply renders this alkali soil equal in fertility to any soil in the country. As it is, the valleys contain a great deal of arable land, 137 which is evident from the great areas covered with grass, which form the stock ranges, and from occasional sections where weeds grow so luxuriantly after the rainy season as to overtop a man on horseback. Some portions of the valleys are covered with mesquite trees and bushes, and also sagebrush, but these sections produce abundant crops when irrigated.

132 CLIMATE.—The climate is very mild, being neither extremely cold in winter nor hot in summer. The mean average temperature during the summer of 1889 was 81.3°, and during the winter of 1889–1890 it was 52.6°.

WATER SUPPLY.—There are occasional wells found among the Indian villages. Natural water holes are quite numerous, and by raising embankments of earth in favorable localities the Papagos make huge ponds or reservoirs, 312 which they call tanks. These natural and artificial reservoirs are only serviceable for the temporary storage of water, and toward the last they become filthy mudholes. The Indians, however, continue to use the water as long as it can possibly be considered a fluid. In one place the Papagos have dug a well 80 feet deep, and with incredible labor have made a footpath from the top of the ground to the level of the water.

Water is found by boring at a depth of from 200 to 800 feet, but no flowing wells have yet been obtained in the territory. The water in the wells rises from 50 to 150 feet, and then is raised to the surface by steam pumps. The Indians, however, have not the financial resources with which to sink or operate artesian wells. When their tanks are exhausted they remove with droves and herds to the valleys and canyons in the mountains, frequently crossing over into Mexico.

137 TIMBER.—The varieties of timber within the Papago range are the willow, cottonwood, mesquite, palloverda, and on the southern and western mountain slopes the oak. The mesquite is the most common timber, as it grows freely on the mesas. It rivals the hickory as firewood, throwing out great heat, and the coals retain fire even longer than coals of hickory. The mesquite, however, is very easy to cut, and is handled with far less labor than hickory.

137 272 262 [273] [313] FRUITS AND NUTS.—The sahuaro (giant cactus), which grows on the rocky soil of the foothills and covers the moderate mountain ranges, rises in height from 10 to 60 feet, and is a mass of vegetable matter, supported by an internal skeleton of ribs or poles of woody fiber. The fruit of this remarkable plant grows out of the top of the trunk and arms, and constitutes an important article of food, the Papagos almost living upon it during June, July, and a part of August. They gather it with long poles, and eat it either fresh or after it has been dried. They make from the juice a syrup and a drink which is slightly charged with alcohol. Although the ribs of the sahuaro are very valuable, the Indians never destroy the plant, and are greatly incensed if a white man cuts one down; but when the cactus dies and the vegetable matter dries, powders, and falls away, leaving the ribs exposed and bare, they are used as supports for the dirt roofs of adobe houses, for the sides of houses when plastered with mud, for poultry and pigeon houses, and other small structures.

262 [273] [388] The Papagos eat the fruit of the prickly pear cactus and make a syrup from its juice; from the mescal (sweet aloe) a highly intoxicating drink is made. The root, which is bulbous, grows partly under and partly above the ground, and when roasted it is very delicious, and great quantities are consumed by the Papagos. They dig out of the ground a vegetable which appears to be a species of wild onion, but they call it a groundnut, and relish it highly when boiled. A very useful plant found in large quantities, called the soap plant (amole), forms a substitute for soap.

282 The tannin root, resembling the sweet potato in appearance, grows in great profusion. It contains a large portion of tannic acid, and is a substitute for the astringent barks, hemlock and oak, which are used in tanneries.

262 252 FOOD.—In addition to the fruits, nuts, and flesh already mentioned, their food consists of wheat flour (usually formed by the women on a metate) prepared in simple ways, parched wheat and corn, boiled wheat and corn, flour made from the mesquite bean, beans, boiled squash, green and dried squash seeds, beef, and poultry.

181 [444] INDUSTRY.—The Papagos seem to be esteemed by the whites in general as the best Indians in the territory. They are industrious, and are good help in mines, on ranches, in the harvest field, and on stock ranges. They easily learn the mechanical arts, and set and handle mining drills as well as white men. The engineer at the Quijotoa mines said his assistant was a Papago, and that he was fully competent to run the engine.

[312] In practical irrigation the Indians are conceded to be the superiors of the whites, and in their domain this is the foundation of agricultural skill. When properly educated there can be no doubt of their ability to acquire the scientific principles of the art.